



**CHINESE PRIDE
COMAC ADVANCES
AMBITIONS WITH
C919 ROLL-OUT
REPORT P13**

GROWTH RATE
Airbus confirms plan to
set A320 production at
60 twinjets per month by
adding Hamburg line **10**

WISH LIST
Israel seeks extra F-15
squadron from USA in
compensation package
for Iran nuclear deal **20**

FLIGHT

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FLIGHT TEST

DAZZLING DIAMOND

We try out Austria's sparkling DA62,
as all-new model cuts path to NBAA

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COVER IMAGE

BillyPix's Ian Billingham took to the air to capture **Diamond's DA62** with test pilot **Peter Collins** at the controls, during a flight from **Wiener Neustadt P28**



BEHIND THE HEADLINES

Mavis Toh joined Chinese dignitaries at the roll-out of Comac's **C919** narrowbody, in **Shanghai (P13)**. Also on the road, **Murdo Morrison** visited **Gulfstream's** home in **Savannah (P34)**, and **Craig Hoyle** received an **A400M** update in **Seville (P18)**



NEXT WEEK DUBAI SHOW

Get all the news and insight from the Dubai air show, as our team reports from Middle East's biennial bonanza

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Comac unveils C919 before Chinese dignitaries **P13**. Analysts debate UK's maritime patrol capability **P21**



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IMAGE OF THE WEEK

Cathay Pacific unveiled its new livery on a Boeing 777-300ER on 1 November. Its fleet will be repainted as part of normal maintenance schedules over the next five years. Its 26 Airbus A350s will be the first of its new aircraft to receive the updated livery when they begin to arrive from 2016

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Cathay Pacific

THE WEEK IN NUMBERS

↑ **44.7%**

Finmeccanica

Nine-month EBITA at Finmeccanica rose strongly to €745m (\$810m); results do not include the now-divested rail unit

\$6bn

ADS Group

Total value to UK aerospace suppliers of global Q3 aircraft deliveries, including £4bn from a record 100 widebodies

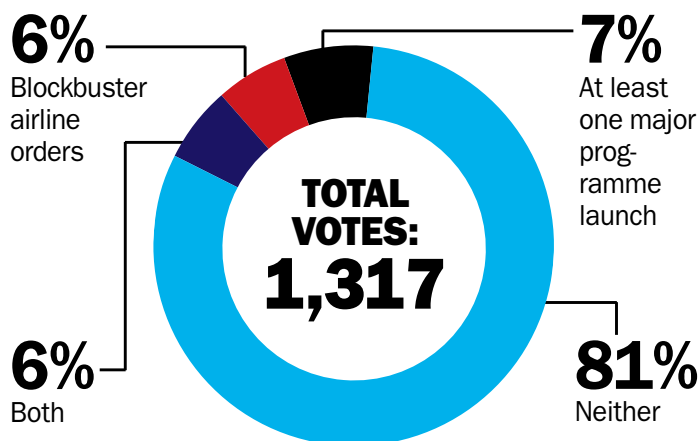
↑ **25.3m**

Airlines for America

Number of passengers expected to fly on US airlines over the 12-day Thanksgiving period, a post-recession high

QUESTION OF THE WEEK

Last week, we asked: **What are you expecting from the Dubai air show?:** You said:



This week, we ask:
Airbus's decision to boost A320 production to 60 per month is:

- ☐ Sensible move to meet Neo demand
- ☐ Unlikely to remain that high for long
- ☐ Step too far for its supply chain

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SHOW HIGHLIGHTS

- ▶ 2016 Feature Country: France
- ▶ Aerospace Emerging Technologies Zone
- ▶ Business Aviation Zone
- ▶ Training and Simulation Zone
- ▶ Singapore Airshow Aviation Leadership Summit 2016
- ▶ Asia Pacific Security Conference 2016
- ▶ Business Forums

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Growing pains

From 2019, the big two airframers will be churning out a total of 112 single-aisle aircraft each month. Airbus believes rate-60 is sustainable, but headwinds could yet blow it off course

Such is the popularity of the next-generation of narrowbodies from Airbus – and to a currently lesser extent, Boeing – that production rates are being lifted to unprecedented levels.

Airbus had already promised to raise A320 output to 50 per month from 2017, across four production lines. But now, based on a backlog of more than 4,300 of its re-engined Neos, it will hike the rate even further – to an eye-popping 60 aircraft each month from 2019.

Boeing, with a firm backlog of 2,869 orders for its 737 Max – not to mention 1,337 for the current NG family – is in a similar position. It plans to increase production at its Renton, Washington assembly line to 52 per month from 2018.

The European airframer says it has stress-tested its orderbook and is confident that rate-60 – and possibly higher in the future – is a sustainable increase.

If there was a global economic slowdown then how many more 'white tails' would be built?

But not everyone shares the sense of optimism emanating from Toulouse. Even for a moment assuming that the world economy does not experience a hiccup, let alone a repeat of the calamitous events of 2008, there are doubts that the latest rate hike is required.

Based on current forecasts, analysts have pointed to a potential oversupply of 200 aircraft by 2019, and that is without factoring in the effects of a potential matching output increase from Seattle.

If there was a global economic slowdown, then how many more 'white tails' would the airframers end up churning out?



Just another 4,299 to go

An equal, if not larger, worry for the aerospace industry will be the ability of the supply chain to cope with soaring production volumes.

The large tier one suppliers are likely to have the financial resources to invest in the raw materials, manpower, facilities and equipment required.

But you do not have to travel far down the supply chain to see that does not hold true for every company. And those smaller businesses churn out vital components for every engine or fuselage assembly.

Equally, size is no guarantee of success, as Zodiac Aerospace's well-documented travails in the cabin segment illustrate.

It does not take too much in the way of mental gymnastics to project the effects of a similar bottleneck on future narrowbody production.

Nonetheless, Airbus remains confident in both its customer base and suppliers.

Should it have read the runes incorrectly, however, this will be a costly mistake for its big money-maker. ■

See This Week P10

Rising sons

This month is likely to be remembered for two iconic moments in Asia's aviation history: the roll-out of the Comac C919 and the first flight of the Mitsubishi Regional Jet (MRJ).

It is important to qualify this statement with "likely", because the MRJ was supposed to get airborne years ago. This slipped to late October, and then, thanks to a last minute change to the rudder pedals, November.

In China and Japan these aircraft are sources of immense national pride. Thousands trekked out to Comac's sprawling production facility at Shanghai's Pudong International airport for the C919's unveiling.

Yet neither jet is set to dominate its segment. For example, when the C919 enters operation, tentatively

around 2018, the Airbus A320neo and Boeing 737 Max will already be in service. Beyond mainland Chinese airlines that have no choice but to operate the C919, international carriers will remain dubious about the aircraft, which will struggle for overseas sales.

Mitsubishi has gained an impressive 223 orders since the MRJ's launch in 2010. But Embraer's re-engined E2 series has already surpassed that figure in the two years since its 2013 launch.

However, to underestimate either aircraft would be a mistake. Although aerospace's centre of gravity will remain firmly in the West for decades to come, a none-too-subtle shift is already taking place. ■

See Air Transport P13



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BRIEFING

REGIONAL GROWTH SPURS ANZ TURBOPROP DEAL

ORDER Air New Zealand has signed a firm agreement for 15 ATR 72-600s, in a deal worth \$375 million at list prices. The airline says that 11 of the turboprops will be used to replace its ATR 72-500 fleet, while the remainder will allow further growth on regional routes. Deliveries of the 69-seat aircraft will begin from late 2016. ANZ still has seven -600s on order from a 14-unit deal signed in 2012.

DYNAMIC 767 FIRE PINNED ON LOOSE COUPLING

INCIDENT US investigators have disclosed that a coupling assembly had become disconnected from a fuel line leading to the left-hand Pratt & Whitney JT9D engine of a Dynamic International Airways Boeing 767-200ER (N251MY) that caught fire on 29 October at Fort Lauderdale-Hollywood International airport. Some 22 of the aircraft's 101 occupants were injured in the emergency evacuation of the twinjet prior to take-off. The National Transportation Safety Board has found no evidence of an uncontained engine failure.

BEIRUT READY FOR ARMED SUPER TUCANOS

AWARD The US government has put Sierra Nevada on contract to deliver six A-29 Super Tucanos to the Lebanese air force by 2019. The nearly \$173 million production contract will provide Beirut with a much-needed close air support capability, and will supplement its air force's three armed Cessna AC-208 Caravans.

AIRBUS CELEBRATES \$17 BILLION CHINESE ORDER

COMMITMENT State-owned China Aviation Supplies Holding Company has ordered a total of 130 Airbus jets in a deal worth \$17 billion. The agreement covers 100 A320-family aircraft, and firms a June 2015 commitment for 30 A330s. Airbus says the deals, which do not specify engine selections, validate its decision to establish an A330 completions and delivery centre in Tianjin.

FIRST METAL CUT AT NEW GEARBOX JOINT VENTURE

PROPULSION Rolls-Royce and Leiherr Aerospace's new gearbox joint venture for the proposed UltraFan engine – to be branded as Aerospace Transmission Technologies – has begun cutting metal. The venture began operating at Liebherr's Friedrichshafen facility in October, with an initial 30 personnel.

PAKISTAN TO RECEIVE TURKISH TWEETS

TRANSFER Turkey is to donate 34 stored Cessna T-37 Tweet jet trainers and related spare parts to Pakistan, under an agreement signed on 28 October. The Pakistan air force already operates 18 T-37s, as recorded by Flightglobal's Fleets Analyzer database.

NEW ASSEMBLY LINE NO THREAT TO DONAUWÖRTH

ROTORCRAFT Airbus Helicopters has played down the potential impact on its existing Donauwörth production facility of a new Chinese assembly line for the H135 twin-engine rotorcraft. The airframer on 30 October signed a letter of intent with Qingdao-based Sino-German Ecopark detailing the move and a 100-unit order.

NASA CALL FOR ASTRONAUT CANDIDATES

RECRUITMENT NASA will next month begin taking applications for a new class of astronauts to be selected in 2017. Candidates must be US citizens with a university degree and relevant professional experience or 1,000h-plus in jet aircraft. To date, NASA has selected more than 300 astronauts and today has 47 on its active roster.



Finnair received its initial Trent XWB-powered twinjet in October

PROGRAMME DAVID KAMINSKI-MORROW LONDON

Airbus confident it can meet A350 delivery forecast

Airframer insists it will hand over 15 examples of widebody this year – although only seven have been delivered so far

Airbus is still aiming for 15 A350-900 deliveries this year, although the company had yet to get halfway to this target by early October.

Six A350 deliveries had been achieved in 2015 at the point when Finnair, the third customer behind Qatar Airways and Vietnam Airlines, received its initial aircraft in October.

While more than half of the planned deliveries would have to be achieved in the fourth quarter, chief financial officer Harald Wilhelm says the 2015 deliveries are “back-loaded”, in line with customer commitments.

Wilhelm gave the update during a third-quarter Airbus Group briefing on 30 October.

Airbus programmes chief Didier Evrard, speaking during an earlier briefing, said the company was “focused on deliveries”. But he is confident that it will reach an output target of 15 A350-900s for 2015. Evrard says the airframer is prioritising the ramp-up of production, and intends to “more than double” the A350 output next year, as it bids to reach a monthly rate of 10 in 2018.

“This is something that is very important for us, and we are

working very hard to reach these targets,” he says.

Wilhelm would not give a specific forecast for 2016 deliveries of A350s, saying that the airframer would be in a better position to make a prediction early next year once the 2015 delivery level had been confirmed.

Cabin interiors will be a key focus for the airframer next year, says Wilhelm, noting that a “favourite” supplier to Airbus had publicly disclosed problems meeting demand to some customers.

Although Wilhelm did not identify the company, seat manufacturer Zodiac has admitted “serious production difficulties” in recent weeks that have resulted in late deliveries – notably to American Airlines, which has sought alternatives for its Boeing 777 and 787 cabins.

“We need to be focused in particular on the interior, and make sure that stuff comes to the [final assembly line] in time, at the quality foreseen,” he says. “[This is] one of the challenges we have to master for 2016.”

Airbus had secured orders for 783 A350s by the end of September, including 598 for the -900 variant. ■



Airbus sets rate expectations for Neo
THIS WEEK P10

THIS WEEK

CRASH DAVID KAMINSKI-MORROW LONDON

UK suspects A321 bombing

British government says possibility Russian airliner was deliberately attacked is “significant”

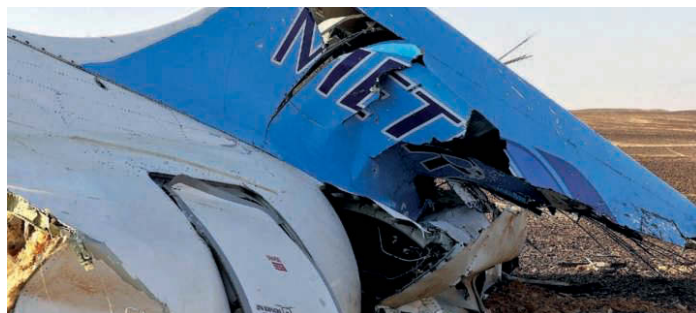
Sabotage has gained credibility a possible reason for the destruction of an Airbus A321 in Sinai, after the UK government said the jet could have been the target of a deliberate attack.

In an unusual step, which appeared to pre-empt the Egyptian-led inquiry into the 31 October crash, the UK’s foreign office publicised its concerns there was a “significant” possibility – based on “a range of sources” – that an explosive device had been detonated on board the aircraft.

Despite the risk of a diplomatic row – particularly since Egyptian president Abdel Fattah el-Sisi had coincidentally been scheduled to visit the UK – the government formally warned against air travel to Sharm el-Sheikh, prompting several UK airlines, as well as Germany’s Lufthansa, to suspend services on the route.

Investigators had yet to analyse flight-recorder data from the Metrojet A321 (EI-ETJ), which had been 23min into flight 7K9268 to St Petersburg when air traffic controllers lost contact.

The crash site encompasses several discrete wreckage areas,



Investigators are combing a 40km² area for the jet’s wreckage

with the burned-out forward fuselage and wings notably separate from the empennage and the A321’s engines. None of the 224 occupants survived.

Russia’s transport ministry says the search has expanded from an initial 8km-by-4km region to an area of 40km².

Both recorders have been recovered from the wreckage. Flight-data recorder information has been obtained but the contents of the damaged cockpit-voice recorder will require additional work to retrieve.

Sinai airspace is listed in the ICAO conflict-zone repository – set up after the shoot-down of Malaysia Airlines flight MH17 – as a

potential threat to civil aviation, and trans-Sinai routes have been mainly flown by Russian and Middle Eastern carriers.

Soon after confirmation that the A321 had crashed, Egyptian authorities requested that air traffic avoid a specific entry waypoint, identified as PASOS, to northern Sinai airspace, and transit the region via other routes.

Despite the UK restriction, Egypt’s civil aviation minister, Hossam Kamal, insists its airports are safe. The UK hypothesis was “not based on facts”, he says, and adds that the investigation team probing the crash had not found “any evidence or data” to support the case for sabotage. ■

INCIDENT DOMINIC PERRY LONDON

Crash of AW609 prototype leaves both pilots dead

Investigations have begun into a fatal accident involving an AgustaWestland AW609 tiltrotor test aircraft which crashed in northern Italy on 30 October, killing its two pilots.

The Italian air accident investigation agency ANSV says the crash site was located in the province of Vercelli, with local media reports suggesting that the tiltrotor came down near the town of Santhià, around 30 miles (48km) from AgustaWestland’s Cascina Costa headquarters and nearby Vergiate production facility.

ANSV says the aircraft, which was destroyed in the crash, bore the registration N609AG, the second flight-test prototype. This was built in 2003 and first flown in 2006.

Flight-tracking website Flightradar24 suggests that the tiltrotor departed from Milan’s Malpensa airport – which is adjacent to Cascina Costa – at around 09:30 UTC.

Certification of the AW609, the world’s first civil tiltrotor, was scheduled for 2017. ■

UNMANNED SYSTEMS BETH STEVENSON LONDON

Reaper upgrade will put Italian air force on target

Italy may become the first country to benefit from a recently-relaxed US government unmanned air vehicle export restriction, as it receives authorisation for a potential deal to arm its air force’s fleet of General Atomics Aeronautical Systems MQ-9 Reapers.

The US Defense Security Cooperation Agency on 3 November said the state department has approved a potential deal covering weapons integration on Rome’s six Reapers.

This follows the February lifting of export restrictions covering the sale of armed variants of the MQ-9, with all non-US militaries

– with the exception of the UK Royal Air Force – limited to the surveillance-only aircraft.

In a deal worth \$130 million, Italy has requested 156 Lockheed Martin AGM-114R2 Hellfire II missiles, eight training missiles, 30 GBU-12 laser-guided bombs,

30 GBU-38 Joint Direct Attack Munitions (JDAM), 30 GBU-49 laser-guided bombs, 30 GBU-54 laser JDAMs, plus installation kits, dummy missiles and spares.

Rome cites the potential for increased contribution to NATO coalition operations, improved

operational flexibility, and enhanced survivability for Italian forces as reasons for its request.

Elsewhere in Europe, Spain is also progressing with its MQ-9 acquisition, which was authorised by the USA on 6 October. Its cabinet agreed on 30 October to modify the budget to allow for the purchase of four Block 5 Reapers, two ground control stations, and sensor and communication equipment with a total value of €161 million (\$175 million).

A formal announcement has yet to be made, and neither the US state department nor the manufacturer were available to comment on the Spanish award. ■



Rome is seeking to integrate Hellfire missiles with its six MQ-9s

MANUFACTURING DAVID KAMINSKI-MORROW LONDON

Airbus sets rate expectations for Neo

Mounting orders for re-engined narrowbody family drives airframer to target production increase to 60 aircraft per month

Airbus is committing to a 60-per-month production rate for its single-aisle family from 2019, when its re-engined version will become its primary focus.

The airframer has had indications from suppliers that this figure could be pushed even higher from 2020, to around 63 aircraft.

Airbus has been exploring options for hiking the rate to burn through the mounting backlog for the A320neo family. In addition to a backlog of nearly 1,200 jets across the current-engine range, it has accumulated orders for over 4,300 A320neo-family aircraft – some eight years' worth.

COMMITMENTS

Its analysis of these commitments has convinced Airbus to invest in additional capabilities. "When we talk about rate-60 in mid-2019, this is fully supported by the audited order book," insists Airbus Group chief financial officer Harald Wilhelm. "In other words we don't have to book [further deals] to satisfy these rates. I think that's important to note."

Airbus had already opted to push the monthly single-aisle output, currently 42 aircraft, to 44 and then 46 next year, before stepping up to 50 in 2017.

It has yet to detail intermediate steps in the rate as it lifts monthly production by a further 10 jets over the following two years.

But Airbus, which has newly opened a US-based final assembly line in Mobile, Alabama, will create a further line at its Hamburg Finkenwerder plant to support the increase to 60.

The airframer has not specified the intended production split across its four final assembly facilities, including its Toulouse base and its plant in Tianjin, China. "[This rate-60 decision] allows for flexibility while taking into account the manufacturing capabilities at each site," it says, although the company's US operation adds that there are "no plans at this time" to take monthly out-



Large commitments for the A320neo, including 430 from IndiGo, have led to an eight-year backlog

put at Mobile beyond the four planned by 2018.

Airbus has previously disclosed Hamburg will produce 24 aircraft monthly, Toulouse 16, Tianjin four and Mobile two under the rate-46 programme for 2016. Wilhelm is confident the ambitious rate increase to 2019 is warranted and that the supply

"We recognise what can be achieved by ourselves and our supply chain"

HARALD WILHELM

Chief financial officer, Airbus Group

chain is sufficiently robust. "One of the key focus [points] was on the engine manufacturing side, where we examined, and discussed, and agreed finally on that ramp-up profile in detail."

Powerplant supply has been one of the main areas of uncertainty because the all-new engines – Pratt & Whitney's PW1100G and CFM International's Leap-1A – account for the majority of the modification from the A320 to the A320neo.

Airbus is making adjustments to its own single-aisle lines to accommodate the higher production rates. It is moving from static assembly to a pulse-line at its UK wing plant, to improve efficiency, and the company has revealed it will integrate its cabin-fitting operation at Toulouse more closely with the final assembly line.

The additional assembly line at Hamburg will provide an opportunity to "bring new manufacturing technology on board", says Airbus, but it has not disclosed the number of additional staff required. Wilhelm says that the company established, during its

supply-chain discussions, that there is room to take the monthly rate even higher from 2020, to the "famous" figure of 63 aircraft which had been suggested by chief operating officer for customers John Leahy earlier this year.

SUPPLY CHAIN

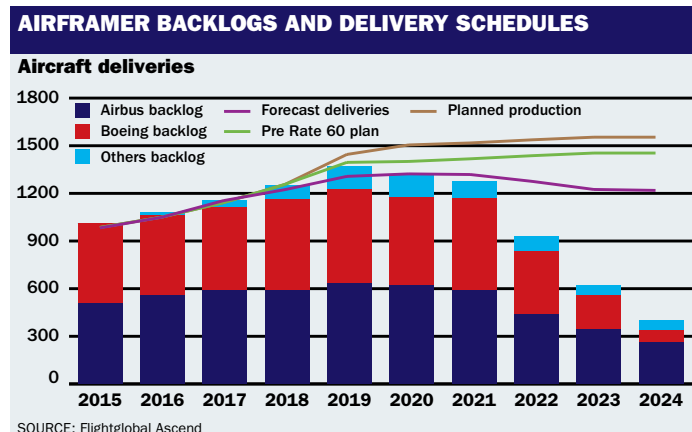
"When you hear today [the plan for] rate-60 in 2019, this doesn't mean our view of the market is softer," says Wilhelm. "We recognise what can be achieved by ourselves and the supply chain."

But analysis of the single-aisle market by Flightglobal's Ascend consultancy reveals a potential surplus of 200 deliveries in 2019.

"If those deliveries are to occur then we either need more traffic growth than hypothesised, more retirements than hypothesised, or lower productivity growth than hypothesised," says head of consultancy Rob Morris. "More traffic growth feels very unlikely given that would require a further four years of expansion in an already long cycle, so it would probably need a combination of the other two, which would not be positive in either case."

Ascend's forecast does not include the possibility Boeing raises its 737 output beyond the 52-per-month rate planned for 2018. That, says Morris, could add a further 100 aircraft to the top line.

"It leads us to wonder if Rate 60 for both manufacturers would be a step too far," he adds. ■





**II-96 to form basis
of joint widebody
AIR TRANSPORT P12**

AIRCRAFT STEPHEN TRIMBLE TORONTO

Globals buck the trend with robotics

“Game changing” manufacturing technology installed on Bombardier’s production line for latest ultra-long-range aircraft

Bombardier on 3 November briefly opened the Global 7000 assembly line to journalists, showcasing a revitalised facility with “game-changing” manufacturing technology for the business aviation market.

Bombardier hired aviation automation specialist Electroimpact for a modern manufacturing make-over of Bay 10 of its Toronto factory, home of the Global 7000 and 8000. The facility now features a five-position assembly line for pulsed moves and emphasising technology to eliminate some variables involved in the process.

The technology starts at the first assembly position, where two wings are joined to the centre wing-box. An automated positioning system uses laser tracker feedback that computes the location of the contours of each assembly, allowing a human operator to move sections into position with greater accuracy. Electroimpact automated the movement of completed assemblies from one position to another. Instead of lifting structures by crane, a robotic train – the Aircraft Transportation Linear Activation System (ATLAS) – carries the completed wing assembly



Stephen Trimble/Flightglobal

The \$71 million twinjet is built at the airframer’s Toronto facility

into the second position.

The wings are mated to the centre fuselage, followed by joining the forward and aft sections to the centre.

Electroimpact is automating this step with robotic systems found in the high-volume production systems of commercial airliners. Two robots are used to circumferentially drill and deburr the thousands of holes required to

rivet and fasten the metallic sections together.

Bombardier plans to use robots to drill and deburr wing-to-fuselage mate assembly and rivet and fasten major fuselage sections.

That requires a complementary robotic “bucking” system, with a robot on the aircraft interior to apply back pressure as the external robot sinks fasteners. ■

See Feature P40



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DEVELOPMENT TOM ZAITSEV MOSCOW

Il-96 to form basis of joint widebody

United Aircraft and Comac considering use of Ilyushin type as platform for proposed Russo-Chinese twin-aisle aircraft

Ilyushin has proposed the use of its Il-96 as a platform for developing a joint Russo-Chinese widebody airliner fitted with new engines.

Russia's United Aircraft (UAC) and Chinese counterpart Comac are aiming to present by year-end detailed plans for jointly developing a twin-aisle jet.

The plans will form the basis of a government-level decision to launch the project, with Russia's and China's aerospace industries to have equal input.

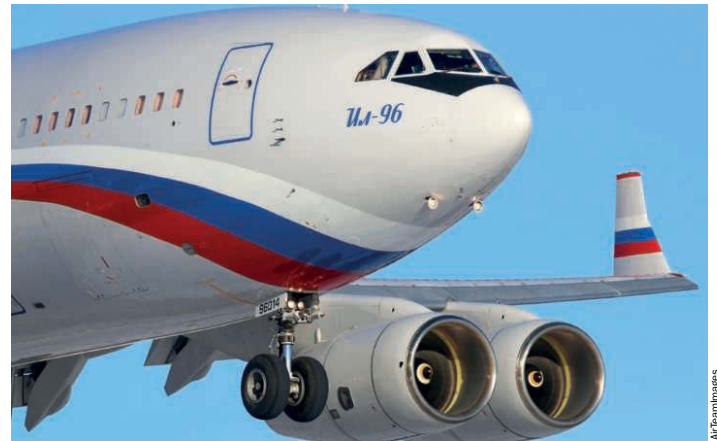
"While state-sponsored negotiations to this end are under way, we've made a proposal to turn to our rich legacy and develop a new aircraft based on the Il-96-300 or stretched Il-96M variant," says Ilyushin general designer Nikolai Talikov.

"The Chinese side is evaluating this idea. In principle, it has no objections to taking part in a joint work on restoring Il-96 production. Thus, the question remains open and is to be resolved soon."

Ilyushin lists the Il-96-300 as having a maximum take-off weight of 250t, with passenger capacity of 300 in a single-class layout. Range is given as 5,300nm (9,800km).

Talikov, however, notes that a proposed widebody airliner would require the development of a new engine.

Each of the 28 Il-96-300s built at the Voronezh-based VASO plant was fitted with four Aviadvigatel PS-90A engines, each rated at 35,000lb-thrust (157kN), while a single example of the Il-96M was



New engines are required to replace the Il-96's legacy PS-90As

powered by Pratt & Whitney's 37,000lb-thrust PW2337.

"Alongside the PS-90, we have the PD-14 turbofan," says Talikov. "Both are suitable in terms of thrust. Looking ahead, we'll ultimately need to have an engine specially designed for a new widebody plane."

The PD-14, which is in the 27,500-34,500lb-thrust range, is being developed by Aviadvigatel as an indigenous engine for the Irkut MC-21 narrowbody.

UAC and Comac plan to jointly develop, secure certification for, and deliver the first twin-aisle aircraft within 10 years. ■

NARROWBODY

Specialists chart course for MC-21 cockpit certification

United Aircraft is preparing for certification work on the Irkut MC-21's primary cockpit instrumentation following a progress meeting at the end of October.

The airframer says the meeting was attended by certification specialists from organisations including Russia's Interstate Aviation

Committee. United Aircraft says the delegates discussed the "scope and method" of qualification tests, particularly for the multi-function displays on the type.

These displays will be the primary source of flight and navigation data to the pilots and provide additional information on the status of

the MC-21's engines and other systems. United Aircraft says the gathering has generated proposals for "optimising" the certification programme in line with the various authorities' requirements.

Key suppliers to the MC-21's avionics system include Ulyanovsk-based UKBP. ■

PROPULSION STEPHEN TRIMBLE WASHINGTON DC

Pratt & Whitney goes fourth with PW1900G flight

Engine maker Pratt & Whitney has launched the flight-test campaign for the PW1900G engine for the Embraer E190-E2 and E195-E2, the fourth variant of the geared-fan turboshaft to take to the skies.

An initial sortie was performed on 3 November from Mirabel, Canada, with the engine installed on P&W's Boeing 747SP flying testbed.

Embraer plans to fly the first E190-E2 in the second half of 2016, ahead of entry into service in 2018. The first flight-test aircraft is in the advanced stages of structural assembly in São José dos



A maiden sortie for the new engine was performed using a 747SP

Campos, Brazil, while engineers in nearby Eugênio de Melo work on validating the safety of flight status for flight control software,

electronics and power systems.

Embraer selected the PW1900G to power the E190-E2 and E195-E2 and the PW1700G

to power the E175-E2, replacing the GE Aviation CF34 turbofans on the current-generation E-Jets.

"The start of engine flight testing is an important milestone as we bring the E-Jets second generation from concept to reality," says Paulo Cesar Silva, president and chief executive of Embraer Commercial Aviation.

P&W has already flown the PW1100G for the Airbus A320neo, the PW1500G for the Bombardier CSeries, and the PW1200G for the Mitsubishi Regional Jet.

So far it has completed more than 23,000h of tests over 40,000 cycles across all models. ■



ALPA recharges call for outright li-ion battery ban
AIR TRANSPORT P14

PROGRAMME MAVIS TOH SHANGHAI

China's ambitions rest on Comac C919

Roll-out of first flight-test example of indigenous narrowbody marks milestone on long march to certification and delivery

As the curtains parted in front of the dignitaries assembled at Shanghai's Pudong International airport – including Chinese vice-premier Ma Kai – the audience was presented with two things.

There was the Comac C919 itself – a narrowbody aircraft set to compete against the Airbus A320 and Boeing 737 that features a host of Western-supplied equipment, including CFM International Leap-1C engines.

But perhaps more significantly, the C919 is also an embodiment of Beijing's ambitions to become a serious player – above and beyond simply being a supplier – in the commercial aircraft industry.

Of course, Comac is aware that the roll-out of China's most advanced airliner programme to date is not an end but a beginning. It now faces a long road to get the aircraft airborne, certified and delivered.

Speech after speech at the unveiling ceremony addressed the challenges the airframer is up against. Vice-premier Kai described aircraft manufacturing as a "complicated technical process", while Comac chairman Jin Zhuanglong called the C919 a "long-term complex project".

DEADLINES

The programme, launched in 2008, has a target of a first flight in 2016. Suppliers indicate that Comac is working to achieve the maiden sortie in the second quarter of next year, with first customer delivery earmarked for the end of 2018.

Programme observers expect these deadlines to slip, and suppliers themselves have called the targets "aggressive".

Chief designer Wu Guanghui, however, is bullish. He tells *Flight International* that he is confident of maintaining the C919's schedule, and is satisfied with progress thus far.

As aircraft 101 – painted in the airframer's corporate colours of white, blue and green – prepares



Ground tests will begin shortly on aircraft 101, ahead of its maiden sortie scheduled for next year

to start ground tests, analysts stress the need for Comac to stick to its timetable. One of the most pressing reasons is that it will enter service after the re-engined narrowbodies from Airbus and Boeing – featuring variants of the Leap powerplants – which arrive in 2015 and 2017, respectively.

Analysts also note that Comac's relative inexperience in systems integration and certification could generate delays, as it did on the earlier ARJ21 programme. The regional jet, which is dated by Western standards,

"China is the world's largest jetliner market right now, with great talent and great resources"

RICHARD ABLOULAFIA

Vice-president of analysis, Teal Group

only received Chinese certification last December, more than 12 years after the programme was launched following a development effort beset by problems. It has yet to be delivered to launch customer Chengdu Airlines.

But those involved in the C919 programme say they have learned from their mistakes. Li Jiaxiang,

chief regulator at the Civil Aviation Administration of China (CAAC), says his agency has approved 60 certification plans and more than 1,000 test verification tasks. The approval programme for the C919 is progressing "in an orderly way", he says.

DEVELOPMENT

For its part, Comac says that thanks to its experience on the ARJ21 it now has a deeper understanding of the flight-test requirements, which will make the process smoother. Co-ordination with the CAAC is also better, it adds.

Programme officials also point to a relatively untroubled assembly process as proof that it has made progress since the ARJ21.

Chief engineer Jiang Liping, involved in both the C919 and ARJ21, attributes this progress to lessons learnt in process control, as well as the improved specifications the manufacturer was able to give suppliers.

One Chinese analyst points out that the ARJ21 had "a lot of design issues to begin with", and that it endured countless retests and redesigns after its 2008 first flight. This should not happen with the C919, he says, since it was "built to a different approach".

The narrowbody's designers have also played it safe, opting to

utilise composites for only 12% of the aircraft. The initial target for a 30% total – including the wings and wingbox – was scaled back to simplify the programme and mitigate possible delays.

Although the development process appears much improved, Rob Morris, head of consultancy at Flightglobal's Ascend operation, says that Comac must establish a global customer support network that compares favourably with those of Airbus and Boeing in order to break into the international market. It must also deliver dispatch reliability for the C919 that matches or exceeds that of the A320neo and 737 Max, he says.

Teal Group's vice-president of analysis, Richard Aboulafia, says China has unquestionable potential, but must change its approach to design and development.

"They need to stop insisting that every part of the aircraft be built in-country. National vertical integration always ends in disaster," he says. "The important point is that China has tremendous potential. They're the world's largest jetliner market right now, with great talent, and great resources."

But sometimes national pride has to take a front seat. "A great nation must have its own large commercial aircraft," says CAAC's Li Jiaxiang. ■



INTERIORS

New cabins for Air Canada A330s

ST Aerospace has secured a cabin reconfiguration contract with Air Canada for eight Airbus A330-300s.

The lead aircraft will be inducted in the first quarter of 2016, with the last twin-aisle targeted for redelivery a year later. The work will see additional premium-economy seats, an enlarged economy-class cabin and the integration of audio- and video-on-demand systems. ST Aero also will conduct maintenance checks on all eight widebody twins.

The maintenance provider has previously undertaken similar work for Air Canada's Boeing 767-300 fleet.

DISPUTE DAVID KAMINSKI-MORROW LONDON

Cargolux under pressure as union row intensifies

Luxembourg-based freight operator Cargolux is facing more pressure from its LGCB union, which will ballot members over industrial action.

The union – which is trying to obtain job security by blocking the company from outsourcing flightcrew and ground personnel – claims there has been a “lack of any meaningful progress” in talks over a new collective agreement.

LGCB has become increasingly concerned over the build-up of the carrier's Milan-based operation, Cargolux Italia, the fleet of which has been gradually expanded. Cargolux has been transferring aircraft as part of a cost-reduction strategy, given the

pressures on the dedicated freighter sector.

The union, which wants to limit Cargolux Italia's operations, claims it has put forward proposals for \$10 million in labour savings, much of it from pilots.

While acknowledging that a strike would have “consequences” for the airline, the union argues that it has “no choice” but to look at industrial action.

It states that it will conduct a ballot “shortly”.

The ballot will put more pressure on the airline when the sides enter a new round of collective bargaining talks, scheduled for 11 November. The current labour pact expires on 1 December. ■

SAFETY JON HEMMERDINGER WASHINGTON DC

ALPA recharges call for outright li-ion battery ban

Pilot body says ICAO safety panel's decision not to prohibit carriage of fire-prone lithium cells poses risk to flightcrews

The Air Line Pilots Association (ALPA), the largest US pilots' union, has repeated calls to end air shipments of lithium-ion batteries, after an international body stopped short of recommending a ban from commercial aircraft.

ALPA says the decision by the International Civil Aviation Organisation's dangerous goods panel does not protect pilots from a well-documented threat posed by the transport of lithium-ion batteries. Describing ICAO's failure to act as “unacceptable”, ALPA president Tim Canoll says lives are being put at risk.

“Until ICAO develops improved packaging regulations... that guarantee that lithium battery fires will not spread, an interim ban on shipping them on all aircraft is essential to safeguarding air transportation,” he says.

“We hope that ICAO will ultimately make the right decision for

protecting passengers, crews and cargo by instituting an interim ban on shipping,” he adds.

While full details of the ICAO panel's recommendations have yet to emerge, it is not calling for an outright ban on the carriage of lithium-ion cells – a move already adopted by some passenger airlines. It does, however, recommend that lithium-ion batteries only be transported if they are charged to no more than 30% capacity.

ICAO has been discussing the issue since at least 2007, but flightcrew concerns have intensified following the loss, after in-flight fires, of two Boeing 747-400Fs – a UPS aircraft in Dubai in 2010 and an Asiana Airlines freighter off the South Korean coast in 2011.

Investigators believe that in both cases the li-ion batteries carried as cargo contributed to the fatal accidents. ■



A UPS 747-400F was lost in Dubai following an in-flight blaze



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AIRLINE TOM ZAITSEV MOSCOW

Leaner times at UTair, after fleet rationalisation

Russia's UTair has near-halved its seat capacity in a year-long programme of cuts, with passenger volumes falling by a similar margin. The carrier now operates 63 mainline aircraft, down from 115 in August 2014, when it introduced streamlining measures to cope with a slump in demand.

Director of passenger services Alexei Budnik says implementation has outpaced the initial schedule for the comprehensive programme centred on fleet and network overhauls. UTair has phased out all 12 leased Airbus A321s and six of 15 Boeing 737-800s, plus four 737-400/500s, leaving 36 737 Classics in service.

On long-haul routes, the airline now uses three 767-200 widebodies, down from nine a year ago, while all nine of its 757-200s were handed over to subsidiary charter specialist Katekavia. On the regional side, UTair has disposed of 15 Bombardier CRJ200s, but retained an equal number of larger-capacity ATR 72-500 turboprops.

Passenger fleet capacity has halved to 8,000 seats over the past year. "On the other hand, we've substantially overhauled our route system," says Budnik. "We've abandoned eight domestic and nine foreign destinations, while launching services on 15 new routes." ■

MAINTENANCE TOM ZAITSEV MOSCOW

Aeroflot builds on rival's ruin

Russian carrier's MRO operation to be bolstered with former Transaero engineering assets

Aeroflot intends to enhance its in-house maintenance capabilities using ex-Transaero engineering staff and assets.

The flag carrier's advisory board has endorsed the creation an enterprise that will provide maintenance, repair and overhaul services for aircraft operated by Aeroflot and subsidiary airlines. This new entity within the Aeroflot Group is to incorporate a technical centre, at Moscow Vnukovo airport, that was leased by Transaero prior to its ceasing operations on 26 October.

"To facilitate approval procedures, we've decided to register it as an affiliate of Aeroflot-Finance," says a source at the board. "Initially, it will be tasked with line maintenance of [the] Aeroflot fleet, including the leased aircraft to be transferred from Transaero."

Aeroflot is looking to take on Transaero engineering personnel as well as the MRO facility.

"Transaero has highly skilled technical staff working there," says the source. "It would be a mistake to leave these specialists behind, the more so that most of them want to keep their jobs under a new employer."

The move follows a memorandum of understanding with Sberbank to transfer operating leases of at least 14 Transaero jets to Aeroflot. These aircraft comprise four



Aircraft formerly operated by Transaero are in storage at Shannon

Boeing 747-400s and 10 737-800s.

In addition, spares specialist AJW Group will, later this month, auction off a range of components from Transaero. The stock covers

parts for 747-400s, 777s and current- and older-variant 737s. AJW says the spares were pledged as collateral under a security agreement reached in June. ■

EMPLOYMENT DAVID KAMINSKI-MORROW LONDON

Rossiia brings staff in from the cold

About half of the 6,000 Transaero employees being accepted by the Aeroflot Group will be stationed with its Rossiia subsidiary.

Aeroflot Group says that more than 3,000 Transaero employees will be recruited by St Petersburg-based Rossiia at a newly-created Moscow subsidiary which was formally established on 30 October. Aeroflot says 585 staff have already been recom-

mended for employment there.

Rossiia is the largest of Aeroflot Group's subsidiaries, contributing 13% of the company's 17.9 million passengers in the first half of 2015.

Aeroflot Group says it intends to take around 700 pilots and 2,800 cabin crew from Transaero, as well as 1,000 technical and 1,200 ground personnel, plus 300 administrative staff. ■

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Atlas seeks time to
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PROGRAMME OLIVIER BONNASSIES & DAVID KAMINSKI-MORROW LONDON

Orders required as A380 loses lift

Airbus declines to talk about potential rate cuts for the double-decker as customer problems cast doubt on backlog

For Airbus, there has been much to celebrate over this year, with the majority of its civil programmes racking up sales or making significant development progress. However, the A380 continues to buck the trend.

The airframer has yet to secure any sales for the double-deck type this year and, during a 30 October third-quarter results briefing, Airbus Group chief financial officer Harald Wilhelm faced questions on the possibility of a production rate cut this year.

Wilhelm declines to be drawn on a potential output adjustment, but points out Airbus is expecting to achieve production break-even on the type this year. The A380 backlog is “good enough” to maintain break-even in 2016 – even at an output of fewer than 30 aircraft, he says. Airbus also is aiming to be “as close to break-even as possible” for the year after, with an estimated overall production of 20-30 jets for 2017.

Wilhelm declines to discuss 2018 forecasts, stating that there is “enough time” to book deliveries for this date. He says the backlog is “very good, in terms of visibility, for the years to come”.

But while he insists that Airbus will not build ‘white-tail’ jets – aircraft with no confirmed customer – he will not be drawn on whether the airframer is considering a rate cut, given the dearth of recent orders.

Wilhelm will not disclose an output threshold for A380 break-even, although he notes that the company has brought this level down from 35 to 30 and is able to take it down further. He says the “priority” is to “work on campaigns”, adding: “Let’s see what that’s going to yield.”

Airbus’s backlog for the A380 has been pressured not only by the lack of new orders, but also by uncertainty over deliveries to a number of customers, including Virgin Atlantic and recently-collapsed Russian carrier Transaero, which had respective commit-



A pair of A380s previously destined for Japan’s Skymark remain stuck on the tarmac in Toulouse

ments for six and four aircraft. In addition, in its order data Airbus lists 10 aircraft formerly assigned to Hong Kong Airlines as now being for an undisclosed client.

The airframer has expressed confidence in the programme, and hinted earlier this year that it could secure a new customer for the type by the end of 2015.

IN STORAGE

The complexity of the problem is further illustrated by the fact that the first two of an intended six A380s built for Skymark Airlines are still sitting in storage at Toulouse, awaiting their fate. Both aircraft – MSNs 162 and 167 – are still in their green primer, save for blue-painted tails.

Wilhelm has previously hinted that the airframer had a reallocation plan for the aircraft, but ruled out a 2015 delivery to an alternative customer.

All Nippon Airlines, which now owns a 16.5% share in the resurrected Skymark, has already dismissed the possibility of taking over the order.

In the absence of any definitive information, a number of different scenarios have been suggested as possible fates for the two superjumbos.

At the ISTAT Europe event in early October, one leasing source

suggested the aircraft could even be parted out, but Flightglobal’s Ascend consultancy offers the more optimistic view that both units are likely to fly again.

“I’m not sure I can see any sense in these aircraft being parted out since there will be major structural components that

“I’m not sure I can see any sense in these aircraft [for Skymark] being parted out”

ROB MORRIS

Head of consultancy, Ascend

would have limited value to Airbus even in the manufacturing process,” says Ascend’s head of consultancy Rob Morris. “Surely the most cost-efficient solution would be to offer these aircraft at attractive pricing to a potential customer, in some attempt to minimise the loss to Airbus.”

The manufacturer will continue to face fresh challenges in reviving sales as used aircraft also begin to hit the market. In October, Malaysia Airlines chief executive Christoph Mueller said the carrier plans to dispose of its fleet of six A380s in 2017-2018, as it takes delivery of four

A350-900s as replacements. There are also remarketing challenges with the type. The first A380 coming out of Singapore Airlines service could leave in two years’ time. The Oneworld carrier, which took the very first A380 in October 2007, has its fleet of the double-deck aircraft on 10-year leases, with an option to extend to 12 years. It has yet to decide on an extension.

The A380 with the earliest lease expiry is managed by German investment fund Dr Peters Group.

LEASE EXPIRIES

Three other units have lease expiries in January, April and June 2018, Flightglobal’s Fleets Analyzer database shows. Another SIA A380, managed by Doric, has a lease running until March 2018.

The fate of the stored A380s built for Skymark, meanwhile, could be decided over the next few weeks. One source says Dubai-based Emirates could end up taking the two aircraft.

Morris says the move would make sense if the airframes could be sequenced into the production schedule for Emirates, and questions whether the aircraft could replace two unallocated slots.

But what Airbus really needs is more orders. ■



PROGRAMME CRAIG HOYLE SEVILLE

Atlas seeks time to build strength

Airbus working to agree contract amendment with A400M customers to address shortcomings in tactical capability

Airbus Defence & Space is in fresh discussions with the launch customers for its A400M, with the goal of agreeing a revised contract by early next year that will amend the transport's delivery schedule and also the timeline for introducing its much-needed tactical capabilities.

Talks with Belgium, France, Germany, Luxembourg, Spain, Turkey and the UK are under way directly and also via Europe's OCCAR defence procurement agency, says Airbus Defence & Space A400M programme head Kurt Rossner. "We are in daily contact with the nations," he says, adding that the process involves "very complex discussions."

The talks are based on the required delivery of tactical capabilities through the rest of this year and 2016 – respectively through Step 0 and Step 1 enhancements – and also cover further developments through to 2018. This roadmap – which Airbus hopes to agree through a contract amendment – replaces a model that used multiple standard operating clearances for the addition of applications including airdrop and in-flight refuelling.

Speaking at the company's final assembly site in Seville, Spain late last month, Rossner said: "We have promised by next year to dramatically upgrade and improve [the aircraft's capabilities]." So far, none of the customer nations have requested any change in the number of aircraft to be produced, he adds. Their combined commitment is for 170 transports, with another four ordered for export customer Malaysia.

Fifteen A400Ms are in current operational service, with the air forces of France (7), Germany (1), Malaysia (1), Turkey (2) and the UK (4). Five aircraft were delivered during the first nine months of 2015, Airbus says, but this

should increase to between 13 and 17 by year-end, depending on the successful outcome of flight-testing for the proposed Step 0 standard and of the UK's defensive aids system equipment for the type.

Operator nations had flown a combined 4,510h in more than 1,100 flights by the end of September, with launch user the French air force accounting for more than 2,700 flight hours and the UK Royal Air Force over 1,000h.

CAPABILITIES

"The customer relationship was one area where we had to improve," Rossner says, adding: "the customer is very happy now to use this aircraft."

In a third-quarter earnings statement on 30 October, Airbus said: "The focus remains on A400M programme execution, and the challenges of military capabilities and industrial ramp-up."

The head of Airbus Defence & Space's Military Aircraft unit, Fernando Alonso, says the company has now stabilised the industrial build-up, and performed a "clean-up" of its plan to develop and introduce new capabilities – a process which he describes as having previously been "ambiguous".

"There are some discrete areas where we have problems, and we are tackling them one after the



Airbus Defence & Space

Landing trials on grass and natural soil were a recent success

other," Alonso says. "Even if we are having difficulties with industrialising the aeroplane and with developing all of the capabilities that we have to deliver to the nations, we are lucky because we have a fantastic platform."

Rossner says flight-testing of tactical capabilities will be the key objective for 2016. "The biggest step we are facing next year is the DAS [defensive aids system]," he notes. Other requirements include resolving an airdrop issue, after a risk of paratroops "crossing" behind the aircraft after jumping from its side doors was identified. It will also work to fully clear the transport to receive fuel in-flight.

For now, however, the company has dropped its promotion of the Atlas as being capable of refuelling rotorcraft in-flight. "To have the A400M as a tanker for helicopters is nearly impossible on technical capabilities and aerodynamic structure," says Rossner. "But we have not abandoned the task, and are still trying to have ideas."

In a recent boost, work to certify the A400M for operations on grass and natural soil landing

strips was completed in October, following a three-week campaign at Écurey-sur-Cooles airfield in France. This involved making approximately 40 take-offs and landings using roughly 4,600ft (1,400m)-long strips.

TOUCHDOWN

"We have demonstrated that we can operate without any damage, and certified and qualified with maximum capacity for braking and using maximum reverse thrust," says head of flight tests and operations Eric Isorce.

Airbus experimental test pilot Tony Flynn says the work involved repeatedly putting test aircraft MSN2 down inside a critical 100m-long touchdown box, at operating weights of up to 114t. This equates to an operator being able to transport and deliver a 30t armoured vehicle, he says. Similar trials will be performed on loose soil and sand during 2016.

Given its ongoing challenges, Alonso has set a conservative target for the receipt of the next export order for the A400M. The company could take another two years to add to its current production target, he believes.

"I am confident that within the next 24 months we will start getting contracts with other nations," he says. The company is in discussions with several countries about their potential tactical airlift requirements, but declines to name them.

Meanwhile, a report into the loss of Turkish air force aircraft MSN23 during its first test flight in May is expected to be released before the end of this year. ■



Airbus Defence & Space

Airbus has stabilised its industrial build-up plan for the Atlas



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TECHNOLOGY JAMES DREW WASHINGTON DC

F-35 secrets 'not releasable' to Israel

Elements of Lightning II's design and construction are to remain classified to allies, customers and development partners

Despite the Lockheed Martin F-35 programme's "unique relationship with Israel", the nation has not been granted unfettered access to every component on the at least 33 aircraft that it will receive from December 2016.

The Israeli air force has relative freedom to upgrade and weaponise its existing Boeing F-15s and Lockheed F-16s, and will have extended access to F-35 hardware. But there are some aspects of the new aircraft that will remain off-limits, says joint programme office head Lt Gen Christopher Bogdan.

"Some portions of the F-35 are not releasable to any partners or customers, not uniquely Israel," he says. "Only the US services and US industry can do certain things on the airplane." He adds: "If there's anything unique to put on the airplane, if we can let

you do it we will, and if not we'll work it, in your country or the US. Israel should be able to do anything it wants to the airplane, sometimes with our help and sometimes not."

Israel will be able to trial indigenously-produced weapons at home, and its F-35s will come equipped with its own choice of command-and-control, radio and electronic warfare systems, Bogdan confirms. "They can uniquely set their own requirements, and we will meet their requirements."

Regarding follow-on modernisation of the F-35 from 2019, Bogdan says that mounting requirements from the 14 Lightning II buyer nations and services could make the Block 4 project unaffordable without a more realistic re-phasing. Israel will be able to choose its own upgrade package, but the timing and items within it will depend on how much the country is willing to pay, or wait.

Current US policy which prevents the sale of F-35s to any Middle East nation besides Israel will remain in place for the "foreseeable future", Bogdan says.

Meanwhile, the F-35A's General Dynamics GAU-22/A 25mm cannon was fired in-flight for the first time on 30 October. ■



Lockheed Martin

Firing tests have begun the with type's GAU-22/A 25mm cannon

FLEET ARIE EGOZI TEL AVIV

More F-15s requested after Iran deal

An additional squadron of advanced Boeing F-15s has been revealed as an element of a so-called "compensation package" requested by Israel in exchange for the US government's negotiation of the removal of international sanctions against Iran.

While details of the request have not been released, Israeli sources say it involves Boeing's Silent Eagle-standard aircraft, which can carry an increased number of air-launched weapons and have conformal fuel tanks for extended-range performance. The type would also be equipped with Israeli-developed systems, if acquired.

Flightglobal's Fleets Analyzer database records the Israeli air force as currently operating 25 F-15s – the youngest of which are 16 years old – and a combined 58 earlier F-15A/Cs.

Israel's wider equipment request has taken shape since an international agreement was reached in Vienna on 14 July to lift sanctions on Iran in exchange for stringent restrictions on the nation's nuclear activities. Other aircraft being requested include Bell Boeing V-22 tiltrotors, Boeing KC-46A tankers and additional Lockheed Martin F-35s. ■

"If there's anything unique to put on the airplane, if we can let you do it we will, and if not we'll work it"

LT GEN CHRISTOPHER BOGDAN
Joint programme office head, F-35

REQUIREMENT JAMES DREW WASHINGTON DC

USN orders last Growlers as Boeing seeks exports

Boeing has been contracted to produce a planned final tranche of 15 EA-18G Growlers for the US Navy, with the company now looking to the Department of Defense and international customers to sustain its assembly line for the F/A-18E/F Super Hornet and its electronic attack derivative in St Louis, Missouri beyond 2017.

Announced in late October, the \$898 million order rounds out the navy's total requirement for 153 EA-18Gs. However, Boeing says there are ongoing

discussions and analysis with the service about additional Growler and Super Hornet orders. Boeing is in the process of

cutting the output rate for the twin-engined type from three aircraft per month to two by the first quarter of 2016, in an at-



US Navy

The \$898m contract will bring the navy's fleet of EA-18Gs to 153

tempt to keep the line viable until at least 2019.

The manufacturer says it remains hopeful of securing orders for another 12 Super Hornets from the DoD following the completion of budget deliberations in the US Congress, while another commitment could come from an undisclosed "Middle East customer". If completed, the latter deal could total around 24 aircraft.

Additional export opportunities for the Super Hornet currently exist in nations including Canada, Denmark and Finland. ■



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REQUEST JAMES DREW WASHINGTON DC

USAF survey to research 'green aircraft' capability

The US Air Force will survey the market for airframe manufacturers capable of delivering up to 10 "green aircraft" from 2018.

A capability request for information notice says the platform must have the size, weight, power and cooling characteristics to accommodate 5,900kg (13,000lb) of mission equipment, including two 272kg "transmitter/receiver" payloads on each side, plus self-protection systems. It also should accommodate two aircrew and five mission specialists working at consoles in the main cabin.

"The prospective aircraft must be capable of maintaining Mach 0.75 and an altitude of 41,000ft



Bombardier will point to its experience with the Sentinel platform

with an on-station loiter time of 3.5h minimum," the notice says.

A "notional" timeline requires airframes to be delivered for integration at a rate of one per year starting in fiscal year 2018, with initial operational capability desired by FY2020.

The contracting office at Wright-Patterson AFB in Ohio says the notice is for market research, and could influence "several programmes, or none at all".

Bombardier says it will respond to the survey. "We will assess the best platform to propose,

building on our experience with programmes like [the UK Royal Air Force's Sentinel R1] Airborne Stand-Off Radar, [USAF] Battlefield Airborne Communications Node and Joint Surveillance Target Attack Radar System (Recap)" candidate.

Embraer and Gulfstream could also put forward offers, from the ERJ-145 to the G550 or G650.

The USAF operates several outdated aircraft that it wants to replace with smaller platforms that are cheaper to operate. Those include the Boeing E-3 Sentry and RC-135 Rivet Joint, Lockheed Martin EC-130H and Northrop Grumman E-8C JSTARS. ■

SURVEILLANCE BETH STEVENSON LONDON

Maritime patrol priorities questioned

Analysts debate importance of competition to select new platform for UK, compared with urgency of restoring capability

With the release of the UK's Strategic Defence and Security Review (SDSR) anticipated as soon as 23 November, the question of whether to hold a competition to reinstate its lapsed maritime patrol aircraft capability continues to drive debate among industry and the Ministry of Defence.

"I do not see a need for a competition, simply because of the urgency of need for this capability," a defence consultant told a Bird & Bird briefing on SDSR conducted under Chatham House rules on 2 November. "We need a proven capability, and we can't afford to take any risk."

Boeing's 737-derived P-8 is at the top of the Royal Air Force's wishlist, but its high cost has

brought the likelihood of an acquisition into question. "If we buy P-8 we're buying an aircraft that is proven, and not having to pay for the development costs of that capability," the consultant argues of the US Navy-operated type.

Another speaker called for "a proper competition, but an extremely quick one", and argues that should Boeing win, its offering would have to include an "innovative solution about ownership and costings", and

integrate UK-developed sensors and electronics.

Sources at the same event suggest that the SDSR will include the advancement "very soon" of a successor for the British Army's Westland/Boeing Apache AH1 attack helicopters, a decision to extend the use of the RAF's Raytheon Sentinel R1 surveillance aircraft until either 2021 or 2025 and the allocation of funds to upgrade the service's Boeing E-3D Sentry fleet of airborne warning and control system aircraft to extend operations to 2035.

A previous proposal to retire the air force's 53-strong fleet of Tranche 1 production-standard Eurofighter Typhoons in 2019 also is expected to be reversed, they suggest. ■



Boeing's 737-derived P-8 is the Royal Air Force's preferred option

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PROPULSION DAN THISDELL LONDON

SABRE cutting path to live testing

With BAE Systems on board, radical UK spaceplane engine is on financial and technical track for 2019 demonstration

British newspaper-readers last week could have been excused for believing that humankind was poised on the cusp of a new Concorde era – indeed, an era of Concorde on steroids. As the *Daily Mail* put it, with typically breathless excitement: “Could we soon fly London to Sydney in FOUR HOURS? BAE invests in 4,000mph hybrid rocket jet engine firm”.

And, the *Mail* went on: “Flights from London to New York could take less than two hours”.

Even the more staid *Independent*, not well known for getting breathless, went with: “UK Government invests £60m in Skylon plane that can fly from London to Sydney in 4 hours”.

Reality, needless to say, is somewhat more nuanced. But the crux of the story – that the engine that could make such hypersonic travel possible should be on track for ground testing before the end of the decade – is something the UK aerospace industry can genuinely get excited about. Breathless, even.

RUNWAY TO ORBIT

What has happened is that UK aerospace champion BAE Systems, with all its financial, technical and organisational resources, and Oxford-based Reaction Engines (RE), with a technical concept that independent experts

have decided is a real prospect for achieving the long-held dream of pushing a reusable spaceplane from runway to orbit and back in airline style, are joining forces.

The deal, pending approval by RE's shareholders, would see BAE invest £20 million (\$30.7 million) in the Synergetic Air-Breathing Rocket Engine (SABRE) in exchange for a one-fifth share in the company. Together, the two companies believe they can have SABRE in full-scale ground-rig tests before 2020, and get it into a flight vehicle soon after that.

RE believes that Mach 5 atmospheric cruise is possible, but the real value of hypersonic speeds is to escape from Earth's gravity and reach orbit. Therefore the breakthrough in late 2012, when the European Space Agency formally declared SABRE to be viable. In 2013, the London government, via the UK Space Agency (UKSA), promised £60 million support for the programme, at which point the 2020 timetable was set out.

In early 2014, underscoring how seriously SABRE is taken, Reaction signed a co-operative R&D agreement with the US Air Force Research Laboratory.

The key to SABRE is a lightweight heat exchanger, essentially a radiator made of many hundreds of kilometres of 1mm tubing capable of liquidising oxygen from in-

The key to SABRE is a lightweight heat exchanger – a radiator made of tubing able to liquidise oxygen

take air by boiling off tanked liquid hydrogen and, critically, not frosting up. A SABRE-powered spaceplane would get its thrust for take-off and early ascent by mixing tanked hydrogen and oxygen from the air until reaching about M5.5 at 26km (16 miles) altitude, when tanked oxygen takes over and SABRE becomes a normal, self-contained rocket engine.

By reducing dramatically the mass of liquid oxygen that must be carried from the ground, RE believes that it can achieve the holy grail of single-stage-to-orbit flight, slashing launch costs and turnaround times with essentially complete reusability.

The company's concept for a spaceplane, called Skylon, is 84m (275ft) long and designed to deliver up to 15t to low-Earth orbit.

As RE managing director Mark Thomas tells *Flight International*, the demonstration engine that is now going into design and development will not be big enough to power Skylon, so those 4h flights to Australia would have to wait.

But the programme has real momentum. Thomas – a former Rolls-Royce chief engineer who joined RE in May this year with a brief to assess the viability of the project, says that, based on the work done with ESA and the USAF, he is convinced SABRE is realistic and achievable, and that rig tests in 2019 are also realistic “if we shake the company”.

For its part, BAE is bringing expertise that is crucial to this next stage of the programme. As engineering director Chris Allam puts it, BAE engineers know heat exchangers, they know how to run a test programme and, critically, they know how to manage one. The company is also good at making industry partnerships: “We come in a very practical sense”.

A WHITTLE MOMENT

Will SABRE become a British engineering triumph like the jet engine? Allam says BAE has been involved in virtually every great advance in aviation and hopes this “genuinely unique” concept will be the next. In any case, SABRE is a route into space access, so the RE investment is strategic.

Perhaps remarkably for a British high-tech venture, money is not an issue. SABRE was invented 30 years ago by RE founder and chief engineer Alan Bond for the UK's abandoned HOTOL spaceplane concept. As Thomas notes, the company raised about £32 million over 20 years. Now, with BAE's £20 million and another £10 million from recent fundraising, RE is half way to the matching funds needed to unlock the UKSA's £60 million. UKSA chief executive David Parker reckons the presence of BAE's “industrial muscle” will have a “galvanising effect” on partners and financing.

Ultimately, Thomas and Allam reckon an operational spaceplane is beyond the scope of UK funding but, if successful, RE would have sealed the UK's place in space. In SABRE, says Thomas, we are preparing “a Whittle moment”. ■



With SABRE engines, the Skylon concept promises reusable, single-stage-to-orbit performance

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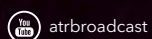
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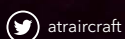
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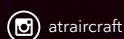
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INFRASTRUCTURE

STEPHEN TRIMBLE WASHINGTON DC

Cirrus customer delivery centre comes into view

Cirrus has broken ground on a new aircraft-delivery centre in Knoxville, Tennessee as it splits customer delivery and service from its assembly and design operations in Duluth, Minnesota.

The CAIGA-owned company plans to launch factory services work at the \$15 million Vision Center at McGhee Tyson airport by mid-2016. A delivery centre is to open in the second half of 2016 for the SR20/22 piston-singles and the forthcoming Vision SF50, a single-engined personal jet.

The centre will provide a complete portfolio of services, the company says, including training, support, sales, delivery, and fixed-base operations.

Cirrus will continue to manufacture its composite aircraft structures in Grand Forks, North Dakota and assemble the aircraft in Duluth. The \$2 million SF50 is scheduled to receive US certification by the end of this year, with first deliveries planned in the first half of 2016.

Cirrus says the three aircraft in its flight-test campaign have amassed nearly 1,000h since the first SF50 – C0 – made its maiden sortie in March 2014. ■

See Feature P40

DEVELOPMENT KATE SARSFIELD LONDON

Traveller on track for 2016 maiden flight, says Tecnam

Italian airframer takes delivery of powerplants for piston-twin as prototypes are assembled

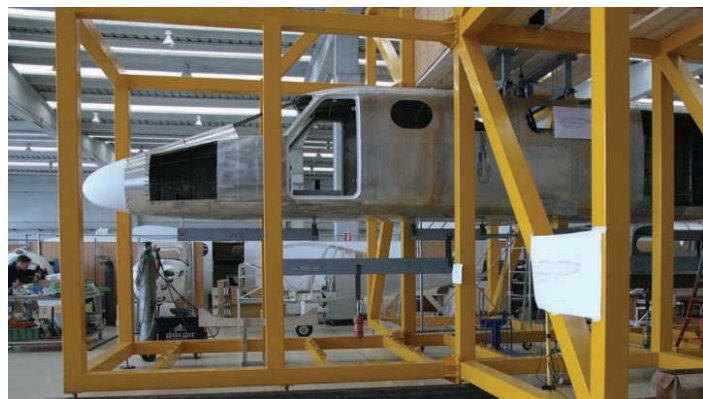
Italian aircraft manufacturer Tecnam is readying its P2012 Traveller for roll-out by March 2016, saying it remains on track for a maiden flight of the new 11-seat piston-twin in the second quarter of next year.

The airframer took delivery of the Traveller's Lycoming TEO-540-A1A engines in October, and they are now being installed on the first test aircraft.

Three prototypes are being assembled at Tecnam's facility in Capua, near Naples. Production is eventually to be housed at a dedicated 5,000m² (53,800ft²) facility adjacent to the current plant, which should open by year-end, says Tecnam chief executive Paolo Pascale.

He is meeting this month with US regional carrier and programme partner Cape Air, which previously signed a letter of intent to purchase up to 100 Travellers to replace its fleet of ageing Cessna 402 piston-twins. "We hope they will commit [to a firm order] by year-end," says Pascale.

Hyannis, Massachusetts-based Cape Air is the biggest commuter airline in the USA, and has



Production will eventually be housed in a dedicated plant in Capua

helped Tecnam to design the Traveller for the commercial-passenger transportation market.

The high-wing aircraft has attracted considerable interest from a long list of international operators, Pascale says, including charter, corporate, cargo and special-missions providers. "We are filling a gap in the six- to 10-seat [Federal Aviation Regulation] Part 23 piston-twin-engined market segment, where no new designs have been introduced for more than 40 years," he adds.

The Traveller – funded through a combination of private and Ital-

ian government investment – has a fixed landing gear to allow it to operate from unpaved runways, large panoramic windows, and four doors, including a sliding passenger door and a cargo door.

Fuelled by Avgas and Mogas, the aircraft is projected to have a maximum take-off weight of 3,290kg (7,250lb), a maximum cruise speed of 210kt (390km/h) at 8,000ft and a long-range cruise speed of 170kt.

European and US approvals for the Traveller are scheduled for 2018, with service entry following later that year. ■

MODIFICATION KATE SARSFIELD LONDON

GV navigation upgrade on course at Gulfstream

Gulfstream has gained US supplemental type certification (STC) for its Future Air Navigation System (Fans) 1/A+ on the out-of-production GV business jet, and is now working on approvals for its GIV and GIV-SP stablemates.

Fans 1/A+ is required over some North Atlantic and Pacific routes and helps air traffic controllers handle growing levels of air traffic by reducing spacing between aircraft and ensuring a specific level of navigation accuracy.

"After 30 January 2020", Gulfstream explains, "aircraft

without Fans 1/A+ will not be allowed to operate in Minimum Navigation Performance Specification [MNPS] airspace – which extends vertically from flight level 285 [28,500ft] to FL420".

MNPS airspace includes the heavily-travelled North Atlantic tracks, which stretch from western Europe to North America.

Gulfstream says the installation requires a Honeywell Mark

III communications management unit, a Rockwell Collins VHF-4000 transceiver and an L-3 Aviation Recorders FA2100 solid-state cockpit voice and flight data recorder.

The General Dynamics-owned company is targeting owners and operators of the 190 in-service, ultra-long-range GV. To date it has outfitted one of the Rolls-Royce BR710-powered twinjets, and says further retrofits are in the pipeline across its eight-strong US service centre network. ■

See Feature P34



The type is often used on North Atlantic routes where levels of air traffic are growing



Jet market jump
SPECIAL REPORT P26

TURBOPROPS KATE SARSFIELD LONDON

US approval near for G90XT

Remanufacturing specialist Nextant planning demonstration tour for updated King Air C90

Nextant Aerospace has completed certification testing of its G90XT twin-engined turboprop, and says US approval for the remanufactured Beechcraft King Air C90 is “imminent”.

The programme was launched by Nextant two years ago in partnership with engine manufacturer GE Aviation, with the G90XT having made its first flight in January 2015. The upgraded aircraft features GE H75-100 turboprops – the first twin-engined application for the powerplant – plus a Garmin G1000 flightdeck and a redesigned interior and cockpit.

“Once certification is issued, we will release the G90XT’s final performance data,” says Jay Heublein, Nextant’s executive vice-



First flight was in January 2015

president. The company will also start converting customer deposits into non-refundable down payments, he adds. Deliveries are scheduled to begin next year.

Nextant is now readying a G90XT for a global demonstration tour to promote the \$2.8 million aircraft and the \$2.2 million up-

grade to current C90 owners. Flightglobal’s Fleets Analyzer database records a global in-service inventory of over 1,800 of the out-of-production type.

Cleveland, Ohio-based Nextant is also continuing to explore new platforms to add to its two-product family, which also includes the 400XTi. The light business jet – a remanufactured version of the Hawker 400-series – entered service in 2013, and more than 60 have been delivered to date.

Heublein says Nextant is “actively looking” at models in the super-midsize, large-cabin and long-range sectors. These include the Dassault Falcon 50/2000/900 families and the Bombardier Challenger 600 series. ■

MODIFICATION
KATE SARSFIELD LONDON

Flying Colours gives Challenger ADS-B upgrade

Engineering and completions company Flying Colours has delivered its first Bombardier Challenger 605 business jet to be upgraded with an automatic dependent surveillance-broadcast – out (ADS-B Out) system.

The handover to an unnamed customer follows US supplemental type certification for the system, which covers the Challenger 600-series of large-cabin twinjets. European and Canadian approvals are also expected by the end of the year, says the Peterborough, Ontario-headquartered company.

ADS-B Out is designed to improve air traffic management by transmitting highly-accurate position data to air traffic control. ■

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JET MARKET JUMP

After several challenging years following the 2008 financial crisis, the 2015 NBAA meeting in Las Vegas will host a business aviation industry feeling the buzz of a sales surge and a spate of new model introductions

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This year's NBAA static line-up could outshine the 2014 turnout in Orlando



BlyPx



BlyPx



Embraer



Cessna

Flight International test pilot Peter Collins got the measure of Diamond's DA62 (left), Embraer is expanding its Melbourne, Florida final assembly facility to handle more models (centre) and smaller types like Cessna's Citation Latitude are leading an orders revival

SMOOTH LINES AND SPARKLE

With Diamond Aircraft set to make its NBAA debut, we travel to Austria to test fly the all-new DA62 piston twin – and find a diesel-powered star in a carbonfibre shell

PETER COLLINS WIENER NEUSTADT

Diamond Aircraft is set to make its debut at the National Business Aviation Association convention in Las Vegas, where it will be promoting its all-new DA62 diesel piston twin as a platform for corporate and charter operations. First deliveries, to European customers, will be followed soon by the first US aircraft – serial number 10, which is the machine that will be on show at NBAA. This will then remain in North America to be used as a customer demonstrator by Diamond Aircraft Industries Canada.

Chief executive Christian Dries says the Austrian airframer anticipates a high take-up from private, corporate and commercial operators – and he is eager to secure a slice of the nascent US short-haul air-taxi market. To appeal to those customers, the US market is being targeted with a seven-seat variant, compared with the five-seater, tailored for Europe and shown at Aero Friedrichshafen in April.

To take the measure of this largest model in the airframer's 10-strong family of propeller-driven aircraft, I travelled for *Flight Inter-*

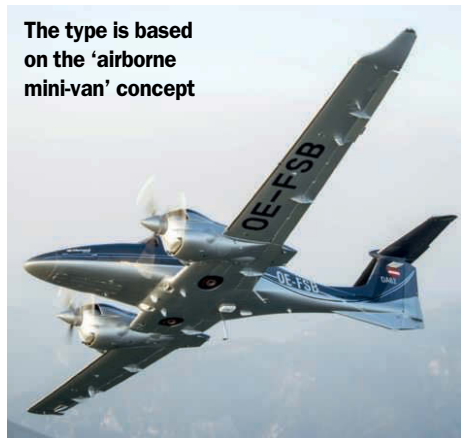
Deliveries to Europe will be followed soon by the first US aircraft – the machine that will be on show at NBAA

national to Diamond's headquarters in Wiener Neustadt to evaluate the production standard seven-seater. My evaluation had two objectives: are the DA62 upgrades significantly substantial and advanced to merit its definition as a new aircraft type; and, does the DA62 have the potential to genuinely be a success in the air-taxi role?

The new DA62 construction remains all carbonfibre (providing +26g crash protection before any structural deformation starts to occur) and is based on the smaller DA42 shape but with a wider (by 14cm), longer (by 63cm) and deeper fuselage shell now equipped with seven seats (in a 2/3/2 seating configuration), at a maximum take-off weight (MTOW) of 2,300kg (5,070lb) as the standard variant, and which is deliberately based on an "airborne mini-van" concept. Additionally, an optional variant comes with five seats (in a 2/3 seating configuration) but with an increased baggage space in the rear of the cabin, in place of the rear row of seats and a MTOW of 1,999kg, to take advantage of lower aviation charges. Some 50% of planned sales of the DA62 are expected to be in North America, and the configuration of both DA62 variants has generated significant interest in the air-taxi market. Both share the same fuselage shell, wings, diesel engines (Austro Engine AE330s) and external dimensions.

The DA62 has just received its European Aviation Safety Agency CS 23 (Normal, Utility and Commercial Aircraft) certification. The company is now working towards US

The type is based on the 'airborne mini-van' concept



The all carbonfibre DA62 is based on the smaller DA42, only with a wider, longer, deeper fuselage shell

validation. The aircraft is certified for single-pilot operation.

For the fully equipped 2,300kg MTOW DA62 variant (air-conditioning remains as an additional option), the fly-away price is \$1.15 million, at current exchange rates.

TECHNICAL SPECIFICATIONS

The DA62 is unpressurised but has a certified ceiling of 20,000ft, when used with the fitted personal oxygen system, and a single engine ceiling of 13,000ft. The maximum speed at 14,000ft (best cruise altitude) with maximum continuous power (95%) is 198kt (366km/h) true air speed (TAS). Maximum range is 1,285nm (2,380km) with a total fuel capacity (Jet A-1 or similar grade) of 326l/85 US gal. Diamond has advanced plans to increase the fuel capacity to 120 US gal using a wet wing design, rather than the present integral aluminium wing tanks.

Take-off ground roll is 480m (1,570ft) and landing ground roll 390m (both at ISA conditions, sea level). Basic empty weight is 1,570kg, giving a maximum useful load (fuel



and passengers) of 730kg. With a typical load of six passengers (at an average weight 80kg), the available fuel load would be 250kg (312l/82 US gal), which would still be very close to max capacity.

The maximum demonstrated crosswind is 25kt. Maximum positive *g* limit is +3.8*g*. Gear limiting speeds are 205 KIAS (kt indicated air speed) gear DOWN and 162 KIAS gear UP. Speed never exceed (Vne) is 205 KIAS. Typical rotate speed is 75 KIAS with flap TAKE-OFF (first position). Single engine safety speed (V2) at MTOW is 87 KIAS flap UP, gear UP. Typical approach speed (Vapp) is 85 KIAS into a landing flare of 80 KIAS with flap LAND (second position).

A weather/ground mapping radar is fitted at the nose and gaseous oxygen tanks (for the personal oxygen system) are contained within the forward fuselage storage area. The aircraft is certified for flight into known icing, retaining the TKS system and delivering the TKS fluid through wing, horizontal and vertical stabiliser leading edge panels. Winglet extensions are now wider and less swept up

into the vertical than the DA42. The DA62 has been fitted with wider, lower pressure tyres to improve its ground handling on semi-prepared surfaces (typically grass). The AE330 engines retain FADEC using single power levers controlling percentage power and with auto-feathering of the propellers in the event of engine failure or pilot commanded shutdown.

Half of DA62 sales are likely in the USA, where it is hoped a seven-seat variant will appeal to the nascent air taxi market

The aircraft retains the Garmin G1000 (two-screen) digital integrated flightdeck but with it now supporting vertical navigation and vertical auto-pilot guidance, automatic dependent surveillance-broadcast out, wide area augmentation system-type navigation, satellite based approach systems (SBAS) for

guided landings at surveyed but austere airstrips, a fully integrated auto-pilot (Garmin GFC 700) incorporating a fully integrated flight director and annunciated flight modes shown on the primary flight display (PFD). Previous analogue standby flight instruments mounted above the G1000 screens, in the cockpit glareshield area of the DA42, have now been combined into two small electronic standby instruments and mounted centrally between the G1000 screens.

The PFD also now displays surrounding terrain using a Synthetic Vision System (SVS) coupled with enhanced ground proximity warning system (EGPWS); a flight path vector symbol; and an improved traffic collision avoidance system display in a 3D type presentation. A take off and go-around button is now located within the face of the left hand power lever handle. The aircraft also now features an advanced Envelope Stability and Protection (ESP) system to prevent it from entering a stall (under speed protection, or USP), exceeding Vne (over speed protection, or OSP) or an over-bank condition. »

» All of the above avionic upgrades now deliver an advanced cockpit to the DA62 pilot, equivalent, in virtually all aspects, to a modern airliner or business jet.

EVALUATION

My safety pilot for the evaluation was Ingmar Mayerbuch, head of flight test at Diamond. The aircraft was the company DA62 demonstrator (at production standard), registration OE-FSB, fuel 18/18 US gal (36 US gal total), at an approximate all-up weight of 1,750kg. The flight was made from Wiener Neustadt (LOAN) with airfield weather: +27°C outside air temperature (OAT), nil cloud, wind calm and airfield pressure 1012hPa (QNH). I would fly the complete evaluation from the left hand seat with Ingmar assisting with the radio and local ATC.

First impressions approaching the aircraft, finished overall in grey and silver colours, were of the absolutely beautiful smoothness of the aerodynamic surfaces and the complex blended shapes that carbonfibre construction allows, especially the fuselage shell. Two large gull-wing doors, in place of the forward hinged clamshell canopy of the DA42, now allow entry to either pilot seat from that aircraft side. A very large single door on the left-hand side allows passenger entry to the middle and rear rows of seats and with the middle row seat backs folding forward to ease access to the rear. The seats were all beautifully contoured and very generously dimensioned. Rear baggage space was generous.

The complete cabin was finished in hand-stitched black leather. It gave me the immediate impression of a luxury saloon car. Single “stick” control columns and single power levers are retained and the cockpit had the feel of a wonderfully uncluttered, modern and calm working environment.

The pilot seat backs can be adjusted in

rake but there is no vertical seat adjustment. Rudder pedal adjustment (fore/aft) remains electric. The removal of the glareshield-mounted analogue standby instruments has allowed the glareshield to be lowered by several centimetres and the re-profiled cut outs at the glareshield corners have together improved forward and downwards field of view (FOV) significantly. The higher roofline of the DA62 allows the curved gull-wing door

First impressions were of the beautiful smoothness of the surfaces and complex shapes that carbonfibre allows

windows to extend further above the pilot's head and this again improves sideways and upwards FOV significantly.

The gull-wing door configuration means the wide, central overhead supporting structure now houses seat specific air vents, spot lighting and individual oxygen connection points. A wide armrest is now fitted between the forward seats and the individual “mic-tel” headset connections for pilots and passengers have all been rationalised and simplified.

Engine controls are simply fuel pump and engine master for each engine. Engine start is now by individual engine button rather than key (once the GLOW caption has extinguished in the PFD warning window). Start and engine stabilisation was instant. The FADEC engine control unit (ECU) has also been simplified into ECU A/AUTO/ECU B.

The G1000 programming was rapid post start (although the Garmin still requires familiarisation if not used previously). Ground

handling was felt to be virtually unchanged from the DA42, with extremely tight turns possible about the braked inner main wheel and using differential engine power.

With power levers slammed from idle, take off acceleration (with flap TAKE OFF) was brisk and with 75 KIAS rotate reached within 15s of brake release. Levelling at 2,000ft, maximum continuous power (MCP) gave approximately 165 KIAS. Above MCP (95% power), the engine power indicator tapes turn from white to amber to indicate a 5min, pilot-observed, time limit.

Engine handling throughout the sortie was excellent with instant power response, linear power delivery to power lever movement and the automatic and accurate limiting of power at 100%, with no power overswing. Even with the noise cancelling headsets removed, the cabin was quiet in the cruise.

POWER

Climbing to 10,000ft (no aircraft oxygen system was installed in OE-FSB for the evaluation) in the manoeuvring area to the southwest of Wiener Neustadt, OAT 8°C, 75/75% power gave 159 KIAS/188 TAS and 15 US gal per hour (total) fuel flow. 65/65% power gave 146 KIAS/174 TAS and 13 US gal per hour (total) fuel flow.

Stalling, in clean configuration, gave an aural stall warning at 78 KIAS, distinct airframe buffet at 70 KIAS and nose drop at 68 KIAS. In landing configuration (gear DOWN, flap LAND) the same reference speeds were 65/62/61 KIAS in the same sequence. The outer wing section of each wing of the DA62 now features five vortex generators at the leading edge. Stalling in all configurations was totally benign, distinct at the g-break and without any wing drop. Ailerons remained fully effective in roll, post stall, even with the



The higher roofline extends the curved gull-wing door windows, significantly improving visibility sideways and upwards



The final landing used approximately 400m of runway distance, with moderate braking

control column held fully back.

Static longitudinal stability away from trim (up to +/- 30 KIAS) was positive but was not overly high (a maximum 3kg of held force) and the electric pitch trim was rapid and precise in negating out-of-trim forces. At 160 KIAS a descending wind-up turn to an estimated +3.5g showed no hint of wing rock or wing buffet. A shallow dive to 205 KIAS (Vne) showed that the controls had stiffened up moderately but the aircraft remained perfectly controllable in pitch and roll and with no associated aerodynamic buffeting.

Laterally, the aircraft rolled at approximately 35°/s (similar to the DA42). Dutch roll was positively damped within two cycles but was instantly stopped with the selection of the yaw damper. The aircraft rolled positively and immediately with rudder application and in the same direction as the applied rudder. Spiral stability was convergent. Rudder ramp inputs at 90-100 KIAS in landing configuration (gear DOWN, flap LAND) showed that heading changes of up to 20-25° could be generated rapidly and with ease, with the wings held level, for a kick-off drift manoeuvre to cope with a 25kt demonstrated crosswind limit.

Single-engine configuration was achieved simply by bringing the selected power lever to idle and turning the corresponding engine master switch to OFF. The engine was automatically shut down with a feathered propeller within 3s and without significant transient yaw. Minimum control speed air (Vmca) flap UP was 76 KIAS.

Gear DOWN foot forces at Vmca were high at (approximately) 40-50kg but lightened immediately upon selection of gear UP. Mini-

mum climb speed single engine (V2) gear UP, flap UP, was 86 KIAS with foot forces now reduced to approximately 15kg, or to zero with half rudder trim selected. An in-flight windmilling engine restart at 115 KIAS required me to put the engine master switch to ON. A fully functioning engine and propeller were then available for pilot power input after just

The single-engine handling characteristics are a safety enhancing feature that will inspire confidence in any pilot

ture pilot and are an enhancing safety feature of the aircraft, especially in single pilot, commercial operations.

The ESP (when selected ON via the Garmin system page) system is active with the auto-pilot (AP) OFF. With AP OFF, a backwards stick force (pitch up) is introduced as the aircraft nears Vne; or, if exceeding 45° angle of bank (AOB) an opposite lateral stick force is introduced until the AOB becomes 30° or less. With AP ON, the OSP function pitched the aircraft up to maintain just less than Vne (205 KIAS) and the USP function lowered the nose automatically to maintain the aircraft's airspeed just above the stall warning speed, holding the aircraft at 76 KIAS clean and took priority over altitude capture/altitude hold. The ESP system and the OSP/USP functions are independent Garmin features that have been combined by Diamond into one integrated package and were another enhancing safety-design attribute of the new aircraft.

TOUCHDOWN

The fully integrated AP functioned extremely well although the mode selection buttons (on the left hand side panel of the right hand G1000 screen) are quite small. The PFD mode annunciations (Lateral – AP/YD – Vertical/Speed), the flight director and the flight path vector were easy to interpret and provide the pilot with an excellent man-machine interface. The SVS, set as background on the PFD, was highly accurate in its depiction of forward terrain and, when deliberately flying towards adjacent mountain peaks to trigger the EGPWS, clearly showed the pilot the best escape direction with the forward mountains now individually coloured red or amber de- »



Single stick control columns and power levers help make for an uncluttered, calm cockpit

» pending on their relative altitudes and danger to the aircraft.

Three tight visual circuits with roller landings completed my evaluation, with a Vapp of 83 KIAS and a touchdown Vref of 75 KIAS. The circuits were an absolute delight to fly. The final landing (the aircraft has no anti-skid) used approximately 400m of runway distance, with moderate braking. Sortie duration was 1h 10min, using just 14gal of fuel.

CONCLUSION

The DA62 is both an outstanding modern aircraft and a standout modern business tool.

The aircraft combines excellent flyability in all flight regimes, including safe single-engine flight following engine failure or commanded pilot shutdown. Its advanced avionic systems and its carbon-fibre construction grant it the highest contemporary levels of survivability even when operated single-pilot. Its short field performance and its luxurious, roomy cabin with up to seven seats, give it unmatched usability for both commercial and private operators. Its affordability, both in terms of its purchase price vs its seat/cargo capability and the economy of its ultra-low running costs, are unmatched in its class.

In 2004, I wrote for *Flight International* that the DA42 "...sets a new benchmark in European general aviation". In 2015, it is abundantly clear to me that the new DA62 now steps up to an entirely new operating level deserving its designation as a new aircraft type and one that has the potential to revolutionise both the commercial air taxi



Collins: short-field performance and luxurious, roomy cabin mean "unmatched usability"

and the family touring aircraft marketplace with a truly incredible combination of economy, performance, safety, avionic sophistication, range and payload.

I believe the DA62 to be the one real aircraft I have evaluated in my test-pilot career that could really work and be commercially successful as an air taxi: single-pilot operation; twin engine safety to meet regulatory requirements; the latest avionics to fly safely in complex airspace or land on austere airstrips with SBAS-type approaches; the ability to fly into

known icing; real room and load capability for up to six passengers; high levels of passenger comfort; and real room for passenger baggage. Commercial performance may perhaps be best for a maximum journey range to destination of around 400 miles/2h in cruise, which would need just 60 US gal (220l) of JET A-1 for the return trip, costing no more than \$250.

It is clearly evident to me why the DA62 has generated such interest. I predict that the DA62 will be an unqualified and worldwide commercial success. ■



A commercial air-taxi success story in the making?



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Gulfstream kept details of its G500 and G600 firmly under wraps until last year



SPEED MACHINE

MURDO MORRISON SAVANNAH
CUTAWAY DRAWING **TIM HALL**

For nearly half a century, Gulfstream has been synonymous with Savannah, and in recent years the business-jet brand has grown to dominate the economy of this compact, riverside city of tree-lined squares and colonial charms. The company's prospects matter for thousands of families, so you might imagine important new product developments would be the talk of the town and beyond. Yet for much of 2013 and 2014 – with in its campus of buildings next to Savannah's airport – Gulfstream managed to keep a big secret from much of the world: the precise nature of its P42 project, a launch that the General Dynamics subsidiary had been working on for several years.

When that programme emerged in October 2014, not as one aircraft but as two, many assumed that the G500 and G600 would replace the G450 and G550. Gulfstream's two existing large-cabin, long-range types, which slot below the flagship G650 and G650ER, are around a decade old and face fresh competition from the likes of the Dassault Falcon 8X. Instead, Gulfstream further surprised the industry by stating that, rather than taking the

The G500 is the first of two top-end jets Gulfstream added to its range last year. We chart the programme's origins, track its progress and assess its prospects

place of the G450 and G550, the G500 and G600 would be offered alongside the older aircraft, giving customers an unprecedented six variants to choose from in the 4,350nm (8,060km) to 7,500nm segment.

RANGE OF DIFFERENCES

In terms of range, the new duo fit between the G450 and the G550. The G500 – the first of the two to market with a scheduled entry into service of 2018, and the subject of this technical description – can fly for 5,000nm at Mach 0.85. The G600, due to enter service a year later, is able to make 6,200nm at the same speed. The G550, by contrast, can cope with 6,750nm, but at a slightly slower M0.8, while the G450 offers 4,350nm, also at M0.8. All four stop short of the G650's range of 7,000nm at M0.85, while the newer, top-of-the-range G650ER can go even further: 7,500nm, also at M0.85. Maximum operating speed for the G500 and G600 is M0.925, the same as the G650.

While these nuances are, of course, crucial to flight departments, the G500 and G600 bring a lot else to the party in terms of innovation. For a start, they have an all-new fuselage: Gulfstream now uses three different 'tubes' for its three families of long-range aircraft. The G500 and G600 are wider and come with more headroom than the G450/G550, with a 2.41m (7.9ft) cabin cross-section and cabin height of 1.93m. This compares with the 2.26m-wide and 1.89m-high G450 and G550. They use engines from Pratt & Whitney Canada rather than Gulfstream's long-running vendor Rolls-Royce, and, for the first time on Gulfstream aircraft, active control, fly-by-wire sidesticks.

Gulfstream's Scott Neal, senior vice-president of worldwide sales and marketing, dismisses suggestions that having six types in a segment of the market where, just a few years ago, it had three, will confuse customers or simply dilute sales that Gulfstream would have secured anyway. "We are very comforta-

ble with the way the aircraft are spaced. There are key differences in range and cabin size,” he says. Prices are fairly evenly spaced too, with the \$50 million G550 coming between the \$45.5 million G500 and the \$55.5 million G600, and the G450 at \$34 million, giving customers more entry points to the brand.

INCREASED OFFER

While the G450 will remain strong in the domestic market, particularly for coast-to-coast missions, the G550 offers that additional range that the G600 cannot. G500 and G600 customers, however, will be swayed by the additional cabin size, advanced flight deck and speed for international trips, he says. His boss, chief executive Mark Burns, endorses this view. “We are now spread very effectively from the G650 down to the G450,” he maintains. “The G650 speaks for itself and the G500 and G600 play off the strengths of the G650. We have three fuselage sizes to offer, with the aircraft offering different performances. We feel good about the way we’ve segmented it.”

However, it seems likely that, at some point, despite its price advantage, the G550 may become squeezed out by the G600. If Gulfstream offers a range extension – as it often does with new types following entry into service – the range advantage of the G550 will become eroded, especially given the higher speed of the G600, not to mention its more advanced cockpit technology and longer, wider, higher cabin. That said, the G600’s entry into service of 2019 gives the G550 a head start. The G450, on the other hand, looks less threatened by the G500, given its \$11 million price advantage and very distinct niche in the market as a US domestic workhorse.

Among a spate of new departures for the G500 and G600, two perhaps stand out – what



The G500 flies faster than the G550



The G500 is due to enter service in 2018

the pilots will experience is markedly different to any other Gulfstream thanks to a new Symmetry cockpit. And, for the first time, a modern, large Gulfstream will not be powered by Rolls-Royce. Neal says the decision to opt for the 15,100lb-thrust (67.2kN) PW814 for the G500, and the 15,700lb-thrust PW815 for the G600 was made after a rigorous competition. “We get asked all the time about why we went for a different engine supplier, and when we explain it our customers are very comfortable with it,” says Neal. “Rolls-Royce will continue to be a very valuable supplier.”

The 10,000-20,000lb-thrust class PW800 was launched in 2008 after Cessna chose it for the Citation Columbus. After that programme was cancelled in 2009, P&WC continued to test and demonstrate the engine – which is derived from the PurePower PW1000G geared turbofan for airliners, and competes with GE Aviation’s Passport 20 and Snecma’s Silvercrest, as well as R-R’s BR725 in business aviation. Unlike the Mitsubishi Regional Jet’s PW1200G, which it most resembles, the PW800, with redesigned low-pressure spool, is optimised for high-altitude cruise rather than the frequent take-offs, lower altitudes and lower speeds of regional jets, says P&WC.

However, it is in entering the cockpit of the G500 or G600 that the most visible change from existing large Gulfstreams is evident. Although the G650 is fly-by-wire, the new aircraft are the first business jets with active-control sidesticks, a technology that allows each pilot to feel the inputs of the other and greatly improves situational awareness in the cockpit, enhancing safety, says Mike Cuson, director of entry into service for the G500 and G600 programmes. Former military pilots may feel at home. The sidesticks were developed by BAE Systems for the Lockheed Martin F-35, and are also present on the Embraer KC-390 transport.

Introducing the sidesticks recreates the mechanical link that pilots experience when they use traditional control columns, says Mark Kohler, vice-president of advanced aircraft programmes. “With fly-by-wire you no longer have a direct link to the flight controls. On the G650, even though you have a central control, it still ends up as wire,” he says. Gulfstream, therefore, decided to take it one step further with active sidesticks. “Sidesticks open up the space [in the cockpit],” he says.

“We are now spread very effectively from the G650 down to the G450”

MARK BURNS

Chief executive, Gulfstream

“But they are also more efficient, and by making them active you reintroduce that mechanical connection. The complexity goes up, of course, so picking a supplier like BAE was important to us.”

The new Honeywell-provided Symmetry flightdeck also introduces several changes, with 10 touchscreens replacing most of the



The flightdeck will seem new, but familiar

» traditional switches, and a “tidied up” overhead console, says Cuson. A touchscreen menu system is being developed with the target of making 90% of the functions a pilot needs available under five tabs, representing different phases of a flight: start-up, taxi, take-off, en-route and arrival. An Enhanced Vision System heightens pilot awareness in low visibility and is standard on the G500 and G600. An improved infrared sensor boosts resolution by 400%, and camera enhancements provide a wider field of view, says Gulfstream.

“Customers have put input into the final product. Their fingerprints are all over them”

MIKE CUSON

Director entry into service G500 and G600, Gulfstream

Despite the radical differences, however, those familiar with the manufacturer’s products will feel at home, argues Cuson. “We have taken many current Gulfstream pilots into the simulator and within minutes they feel comfortable with the new technology,” he says. “Much of the design, look and feel is similar to existing products. They are not startled.” Gulfstream customers are used to change, adds Neal: “We have always been innovators on the flight deck. We were the first with a glass cockpit, the first with a head-up display, the first with synthetic vision. Now we are the first with active control sidesticks in a business jet, and the first touchscreens in a large cabin aircraft.”

CUSTOMER INSIGHT

Customer feedback – not just from pilots – has been crucial to the design of the overall aircraft, says Gulfstream. Select customers comprising what the manufacturer calls its 35-strong Advanced Technology Customer Advisory Team were briefed twice a year on progress, under non-disclosure agreements. These pilots, flight attendants and representatives of flight operations and maintenance departments suggested numerous tweaks. “As a result, over 200 design changes were made,” says Cuson. “They truly have put input into what the final product looks like. The fingerprints of our customers are all over these aircraft.”

This was particularly true when it came to the cabin. Gulfstream has invested in a G600 cabin mock up – the G600’s 13.8m-long cabin, not including baggage area, is 9.1cm longer than the G500 but identical in almost every other way. “We invited people into it at NBAA [in October] last year and we followed them around with an iPad noting what they said,” says Cuson. “We will have the mock-up again at NBAA and you will be able to see what changes we made as a result. They wanted as



The G500 will have the same size windows as the G650



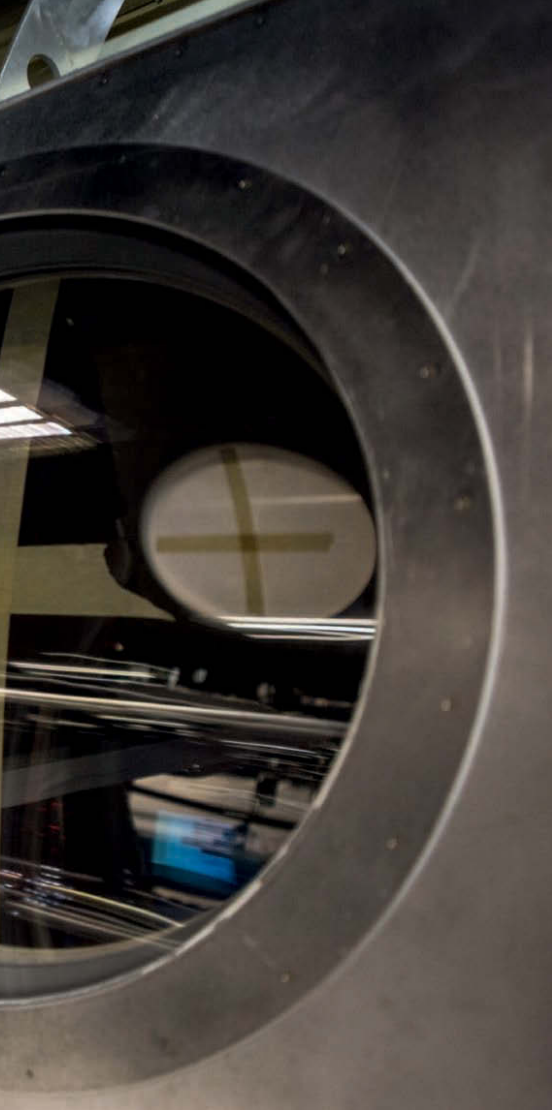
Customers were heavily involved in the cabin design

much space as possible, they wanted the latch design changes so opening cabinets was quieter, deeper cup holders, a wider ledge, more storage for iPads and different lighting.”

The G500, which can carry 19 passengers, has 68.5cm-wide seats with articulating footrest and the same porthole-style windows as the G650 – 15% larger than those on the G550/450. There are height adjustable, pedestal-mounted conference tables, and Gulfstream says the G500 is the only aircraft in its class with the option of forward or aft galley. Although cabins are fairly customisable, custom-

ers have no choice over where their interior is installed. All Gulfstream completions are carried out in-house, either in Savannah or at its newly expanded Long Beach facility. “The reason is that you don’t want it to be a Gulfstream with someone else’s interior,” says Neal.

Structurally, the G500 and G600 wing will be based on the G650’s, although for the first time Gulfstream has brought the wing and tail design and assembly in-house. There had been concerns with the supply chain’s ability to deliver wings on time on previous programmes – Spirit AeroSystems for one run-



is much more automated than is traditional on a Gulfstream product thanks to processes such as chemically bonded stringers – introduced for the G650. “On a G650 there are 80% fewer fasteners than on a G450 or G550,” says Gulfstream. “This evolves it further.”

FIRST TESTS

The first flight of the G500 took place on 19 May, with N500GA staying in the air for 2h 15min and reaching an altitude of 15,000ft. After a pause of “several weeks” to prepare the aircraft for flutter tests, flight testing resumed in August. By mid-October, the jet had surpassed more than 100h of flight on “more than 45 missions”, the longest of which was 5h 22min. The aircraft has reached an altitude of 38,500ft and maximum airspeed of M0.8. “This plane has been flying exactly as expected, which highlights our commitment to quality and our attention to detail,” says Dan Nale, senior vice-president, programs, engineering and test.

Of the four test aircraft, the first, T1, is focused on flight performance and controls, with the second, T2, on flight loads validation. T3 is used mostly to test avionics, and T4 human factors and supporting systems. The programme also includes an aircraft with a fully outfitted interior. Gulfstream said on 14 October that it had completed initial testing of the aircraft’s handling qualities as well as its high-speed and attitude recovery stall system. Flutter and envelope expansion testing was continuing on T1, while T2 and T3 were being prepared for flight. The G500 has also completed static-limit load-testing on its primary structural components.

Gulfstream has invested heavily both in research and development laboratories but also in ground testing facilities, and places great store on the fact that its extensive pre-flight de-



Two iron birds are now in operation

velopment process has allowed flight testing to pass smoothly. Some 37,000h of testing have been carried out on its so-called system integration bench, integration test facility (ITF) and separate iron birds for the G500 and G600, a process that will continue until the turn of the decade. “We’ve had no maintenance squawks,” says Kohler. “We are convinced that the investment in the labs has allowed us to do this. We have been able to mature hardware and software in a controlled environment.”

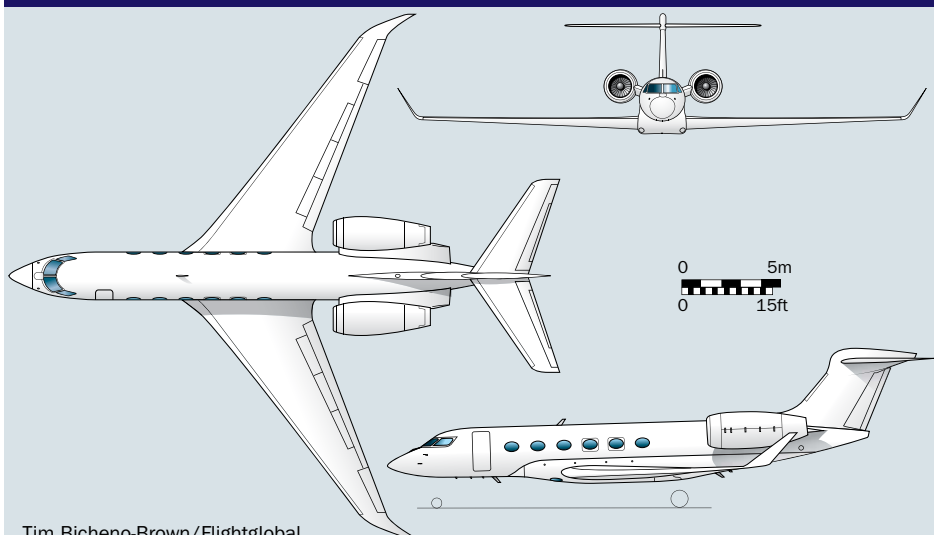
Gulfstream introduced its ITF for the GV programme to integrate Honeywell devices in overhead panels. “We’ve taken that a step further to create a fully visual system,” says Kohler. “It’s more wraparound. It gives pilots all the visual cues they need.” The system integration bench has been running for five years and is “very centric to evaluating Honeywell

ning into difficulties – but Gulfstream says the decision to build the structures next to its final assembly line in Savannah is to “give us more flexibility in the build cycle”. Burns adds: “We looked at industry capacity and we had a competition, but we decided to meet the capacity needed in house. We will do the same exercise in future for all our products.”

Production of the first G500 is under way in a new final assembly line facility, one of two recently constructed buildings on the Savannah campus (the other makes the wings for the two aircraft). Two older buildings closer to Savannah airport’s terminal house the final assembly lines for the G550/450 and the G650/G650ER. When we visited in October, there were three G500s in assembly in addition to the three already with the flight test department. Manufacture of the first G600 flight test example – the programme is roughly 18 months behind the G500 – is underway and the type, says Gulfstream, is on track for its first flight in 2017.

There are four main areas in the final assembly line. Fuselage panels arrive from suppliers and are pieced together using a Broetje machine. On the next station the sections are joined to make the recognisable fuselage barrel, before wings, tail, engines and landing gear are fitted. On a final station, the likes of farings and windows are installed before the aircraft is set for power-on and ground testing. The process

GULFSTREAM G500



Tim Bicheno-Brown/Flightglobal



Gulfstream says its investment in pre-flight testing facilities has paid off

» avionics and the data concentration network”, says Kohler. Integrating the active control sidesticks has also involved extensive work in “developing the control laws which would be the interaction from the pilot through the sidestick. It was new technology for us and we had very strict design requirements.”

The transition of Gulfstream has been remarkable from its dark days of the 1990s when its workforce numbered in the hundreds and it went through several owners after being divested by original parent Grumman. Under General Dynamics, the company has enjoyed a decade and a half of intense investment and product development, introducing more than half a dozen new types as well as acquiring its mid-cabin portfolio – what are now the G150 and G280 – from Israel Aerospace Industries. Since 2006, Gulfstream has more than doubled its Savannah workforce to 10,000, with a further 6,000 working elsewhere, including the company’s maintenance and completion centres.

Gulfstream argues that it has managed to keep an edge in the sector because it has invested heavily in R&D. Gulfstream opened its first R&D centre in Savannah in 2006 and now there are four buildings, all situated close to the new G500 and G600 final-assembly line, and employing a total of 1,700 engineers. According to Burns, General Dynamics insists on high levels of R&D spending, especially between programmes. “It’s the view of our chairman

that we have to be continually investing in new products,” he says. Before 2006, the company had tended to hire engineers on contract when it had a new programme to develop, and released them afterwards.

COMPETITION

Although Gulfstream continues to face strong competition from Dassault – which is currently bringing two new products, the 5X and 7X, to market – Bombardier’s problems have seen it lose ground in an intensely competitive long-range, large-cabin segment. In July, the Canadian manufacturer announced a two-year delay in its 7,300nm-range Global 7000, taking entry into service to the second half of 2018. The even longer-range Global 8000, originally scheduled for 2017, is likely to face a similar wait. This gives Gulfstream several years of exclusivity in the 7,000nm-plus range segment. “Our G650 remains a unique product,” says Burns.

With its current six models, Gulfstream is on track to build 150 aircraft this year, around the same as last year. As for products beyond the G500 and G600, Burns is understandably tight-lipped. Of all of its aircraft, the midsize G150 faces most competition in a slow-selling segment. While Gulfstream remains committed, he admits “the market will decide the G150’s future”. As for one of the most elusive concepts in the industry, Burns says there are no near term prospects of a su-



The G500 is being built in a new factory

personic business jet from Gulfstream. “But as the technology evolves, we’ll become more and more interested,” he says. “We continue to invest hours in understanding the technology.”

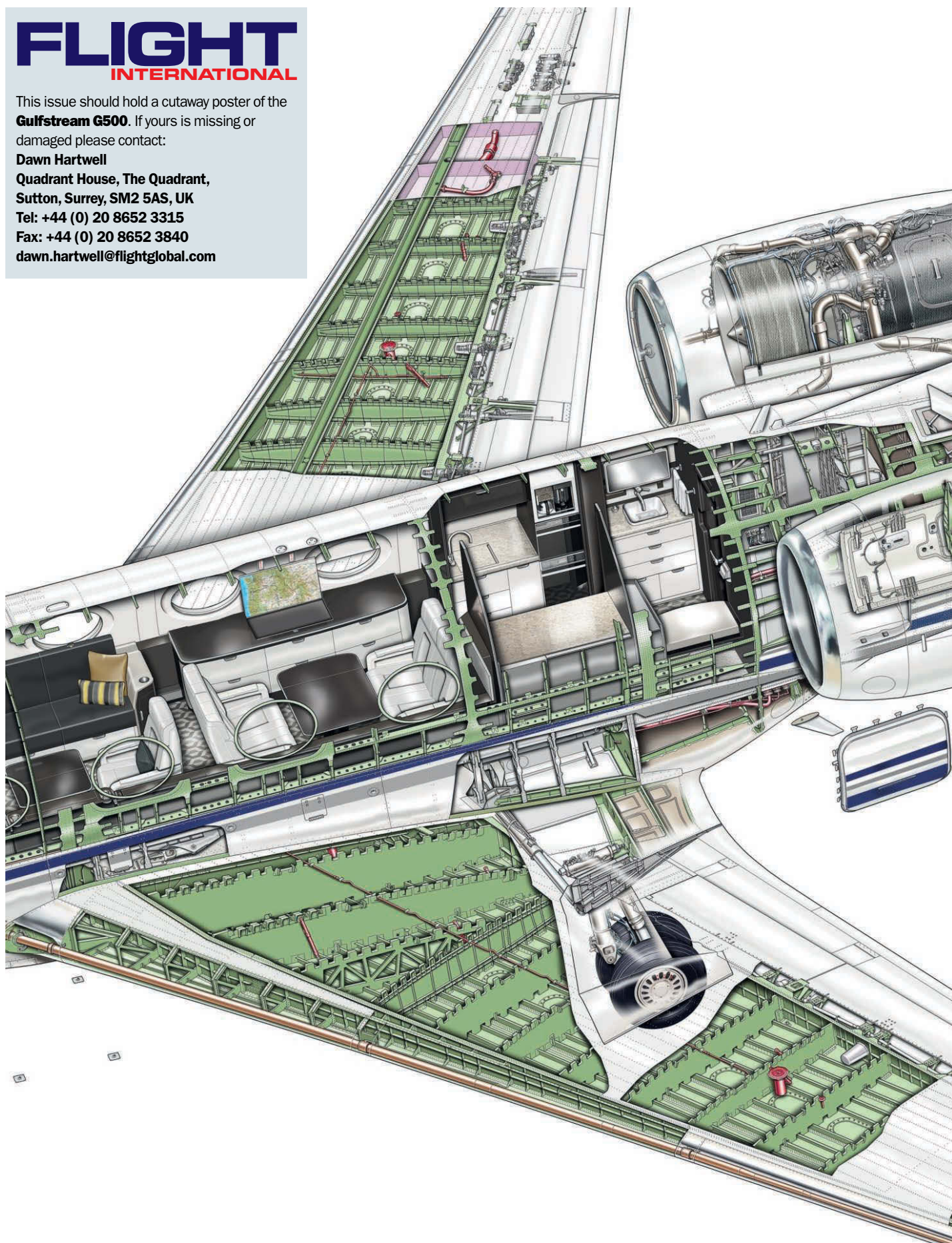
Gulfstream may have kept quiet about the G500 and G600 for several years, but it is making plenty of noise about the programmes now. After more than a decade in which emerging markets overtook the USA and Europe in terms of demand for this most American of brands, the economic slow down in Brazil, China and Russia is seeing sales swing back, and this year Gulfstream expects some 60% of its deliveries to be to its traditional markets. With the arrival of the G500 and G600, the manufacturer is giving customers in this segment more choice in range, speed, capacity and price than they have ever had. ■

FLIGHT

INTERNATIONAL

This issue should hold a cutaway poster of the **Gulfstream G500**. If yours is missing or damaged please contact:

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The recent introduction of the Cessna Citation Latitude to the market is one of a slew of small-jet debuts which have whetted appetites

After several miserable post-crisis years, the market for smaller business jets is enjoying a bounce – just as sales of top-end aircraft start to show an accelerating decline

KATE SARSFIELD LONDON

It's show time again for the business aviation industry. The annual NBAA convention, the largest and longest-running event within this niche sector, is returning to the bright lights of Las Vegas – a fitting host for a market that is starting to emerge into the light following a miserable few years.

"There is certainly a climate of optimism in the industry right now," says Ed Bolen, chief executive of NBAA, the trade association that has been hosting the popular gathering for nearly 70 years.

His sanguine outlook is partly attributable to a strengthening US economy and rising consumer confidence: "The rebound of the US market is a welcome fillip to the industry. Its growth is reflected across all the metrics – both new and used aircraft sales, the pre-owned inventory and hours flown."

US DOMINANCE

The significance of the US market to the business aircraft industry is manifested in the size of the country's business-aircraft inventory. Flightglobal's Fleets Analyzer database records an installed base of around 18,000 tur-

bine-powered aircraft – nearly 60% of the world's fleet. The return of the economic hegemon to rude health is particularly good news for the manufacturers of light and mid-size business aircraft – the USA has traditionally accounted for the vast majority of sales, and when the 2008 economic downturn struck, orders evaporated.

And the introduction of a slew of innovative new designs and upgrades over the past 18 months has also contributed to the lower-end market-rebound by whetting the appetites of discerning buyers. Notable debutantes include the Embraer Legacy 450 and 500, Cessna Citation Latitude and Citation X+ and Bombardier Challenger 350.

In a recent report, Flightglobal's Ascend consultancy revealed that these new products coupled with an improving US market helped to deliver a 16% increase in shipments of midsize aircraft in 2014, to 170 of all types.

"The rebound of the US market is reflected in new and used sales and hours flown"

ED BOLEN
Chief executive, NBAA

This compares with 147 the previous year. Light-jet deliveries also shot up by 11% during the same period, to 286 aircraft.

For the top-end of the business jet sector, however, the picture is less auspicious. Following a long period of booming orders and unrelenting demand from global buyers, sales of large-cabin, long-range business jets and VIP airliners have stalled.

"After years of being a major, reliable revenue driver in the business aviation industry, sales of large business jets are beginning to show signs of fatigue," says aerospace analyst Brian Foley.

TOP-END DECLINE

Foley explains that unlike their low-end stablemates, the market for aircraft with seating for more than 15 passengers and price tags in the \$35-75 million range was barely fazed by the worldwide financial crisis. "Conversely, sales of smaller, more modest jets declined by two-thirds during this period, forcing planemakers in that segment to halve staffing [Cessna, Piper Aircraft], and in one case fold [Hawker Beechcraft].

"The split personality between big and small is showing objective evidence of change, and is in fact reversing."

Teal group analyst Richard Aboulafia describes the current market as a "funhouse-mirror reflection of 2009-2010 when the US market was dead and it was all about the BRIC nations, and the high-end market".

Not any longer. A combination of factors are to blame for waning top-end demand: economic slowdown or outright recession in emerging markets like Brazil and China, which geographically have a need for ultra-long-range jets; a strengthening US dollar, which has made these aircraft too costly to purchase; and the decline in commodity prices – particularly oil.

Fleets Analyzer shows deliveries of large-cabin, long-range jets and VIP airliners fell from 265 in 2013 to 262 last year, and suffered a 15% decline in shipments between January and June this year compared with the first six months of 2014.

Not surprisingly, this sliding demand has hit the high-end aircraft builders hard and the pain is being felt across the board.

Bombardier has slowed production of its super-large Global 5000 and long-range Global 6000 and recently announced a two-year delay to the Global 7000 and 8000 jet development schedules. At the same time, Dassault reported just five sales of its Falcon business jets in the first-half.

While Gulfstream recently accelerated deliveries of two new, large G450s to US fractional ownership company Flexjet, this move, Foley believes, is an attempt by the business-jet goliath to manage its order book “by making unsold delivery positions available sooner to waiting customers.”

He expects the overall shipment tally to climb this year, but the bulk of the deliveries will be in the lower half of the sector.

The knock-on effect will be a decline in the total value of the annual shipments: “Although more small and midsize jets are being sold, you have to sell up to 10 of them to offset the value of just one big Gulfstream lost sale. The net effect of this is that over the next cou-



Dassault's 5X is set for delivery in 2018

ple of years, more units will go out the door without moving the needle on overall industry values.

“This anomaly won't rectify itself until 2018, when a slew of new, large, pricey jet models hits the market.”

These new entrants include: the G500/G600 – the latest large-cabin, long-range offerings from Gulfstream which are scheduled to enter in 2018 and 2019 respectively; Bombardier's Global 7000 and 8000, which

“After years of strength, sales of large business jets are now showing signs of fatigue”

BRIAN FOLEY
Aerospace analyst

the company has pegged for certification around the same time; Dassault's 8X tri-jet and 5X twinjet, which are slated to land in customer's hands in 2016 and 2018 respectively; and the large-cabin Citation Longitude.

The ongoing development of new and upgraded aircraft within this segment is testament to the airframers' growing confidence in

the market.

Even further down the line, Dassault is likely to launch a longer-range version of the widecabin 5X to rival the sector-busting G650/ER and Bombardier's Global flagships. Embraer, meanwhile, could take a leap into the ultra-long-range sphere, and fill the void at the top of its seven-strong product line.

RECOVERY DRIVERS

For the time being, the recovery will be driven by the small and medium segment, where another handful of eagerly anticipated offerings are expected to enter service over the coming 24 months. These include the long-awaited HondaJet. The light twin – which made its first flight in 2003 – received provisional type certification in May, but still has to clear final certification.

HondaJet could be pipped by Cirrus Aircraft's Vision SF50, which is earmarked for US validation and service entry late this year. This milestone will secure the SF50's position in the aviation history books as the first certified single-engined personal jet. Meanwhile, Pilatus Aircraft's development of the superlight PC-24 is progressing on time, with the Swiss airframer targeting 2017 for the entry into service of its first business jet.

Despite the pipeline of strong and appealing new products, Aboulafia maintains that market growth will not be rapid. He predicts deliveries of 9,018 business jets between 2015 and 2024 with a value of \$277 billion: “It's a very conservative forecast, given the recent history of false starts,” he notes.

Of one thing he is certain. For at least the next 10 years, the business aircraft industry will not return to the heady days of 2007 – when lengthy backlogs and record orders were the norm. ■



Swiss manufacturer Pilatus Aircraft is set to further boost the small and midsize segment in 2017 with the debut of its PC-24 superlight jet



Beechcraft

Typical types for ride-sharing offers are propeller models such as Beechcraft's Bonanza, promising flights at a fraction of the cost of a jet charter

END OF THE RIDE?

Ride-sharing in the USA has made a once elite private transport market more affordable for passengers and pilots alike – but success has brought with it scrutiny from the FAA

KATE SARSFIELD LONDON

Attracting new entrants to the business and general-aviation market has long been a challenge for the industry. The cost of buying, hiring or even flying in a private aircraft is beyond the reach of most people, and consequently access to this elite sector has largely been restricted to corporations or high-net-worth individuals.

A handful of innovative, little-known companies have begun to change this perception, however, through the introduction of ride-sharing technology.

By offering spare seats on privately owned and piloted aircraft to individuals who are seeking to reach the same destination, these websites have helped to make private-aircraft travel accessible to a far wider audience.

"We have simply designed a forum for private pilots with an empty plane to share the cost of his travel expenses with someone heading in the same direction," says Steve Lewis, co-founder and chief executive of US-based AirPooler.

Pilots post destination details and the number of seats available, he explains. The passen-

ger agrees to pay the pro-rated costs of fuel, taxes and fees. The Boston-based company, founded 18 months ago, has joined forces with two of the region's largest training schools to build up its pool of pilots.

"There is a huge number of under-utilised aircraft in the US," Lewis continues. "Many pilots have cut back drastically on their flight time as the cost of owning and operating an aircraft has sky-rocketed."

AFFORDABLE FLYING

He believes the concept of ride-sharing websites enable pilots to fly more frequently, as their costs – fuel, insurance and other related expenses – are cut in half.

"For the traveller, too, flying is not only affordable but now it is easily accessible," Lewis says. "These ride-sharing portals have helped to open up the benefits of private aviation to a whole new community of people who never considered travelling this way before."

His views are echoed by Alan Guichard, co-founder and developer of fellow US ride-sharing website, Flytenow.

"Pilots have always relied on ride-sharing as a way of reducing their expenses, bringing

down the cost of flying to a more affordable level," he says. "The use of shared-economy technology just makes that a whole lot easier."

Types of aircraft typically posted in ride-sharing sites are single- and twin-engined, propeller-driven models such as the Cessna TTx and Beechcraft Bonanza respectively.

The cost of sharing a ride on these aircraft is significantly cheaper than commercial charter, as Guichard explains: "An air-taxi flight from Boston to Nantucket will cost around \$1,500 on a small, traditional private jet. The same journey costs around \$100 on a piston-engined type if you share the expenses with the pilot. Even less if there is more than one passenger.

"It is affordable because, unlike the commercial operator, the pilot is not making any money from the service. It is, purely and simply, a cost-sharing exercise and a win-win for both parties," Guichard continues.

Flytenow launched in January to fill what Guichard describes as a gaping void in the private air travel market. "There are 25 million non-commercial flight hours conducted every year in the US, and thousands of private pilots are flying with empty seats," he says. "Added to that there are up to 5,000 airports open to

business and general aircraft compared with only 500 for the typical commercial airliner.”

As with AirPooler, Flytenow’s inspiration for the venture was the advances in internet technology and the widespread use of computers and mobile devices.

“The internet has allowed us to develop a simple, user-friendly vehicle for pilots to find passengers to fly with them,” Guichard says.

He dismisses any comparison with the car ride-sharing service UberPool. “Those drivers work for a profit. Our pilots don’t make any money from the service. There is a clear difference between the two types of operations.”

Guichard says the pilots who list the flights have different levels of experience, varying from recently qualified private pilots to those with many hours of commercial and military flying experience. “The customers aren’t going blind into the transaction. The details of the pilots’ qualifications, experience and training, along with the aircraft type and age, are listed on the website. It works very well.”

Flytenow and AirPooler have been hugely successful – but despite their popularity, the survival of these portals is now under threat.

“The pilot is not making any money from the service. It is simply a cost-sharing exercise”

ALAN GUICHARD

Founder and developer, Flytenow

Their rapid growth has attracted the scrutiny of the US Federal Aviation Administration, and its apparent opposition to these portals is threatening to send the web-based ride-sharing market into freefall.

“It’s partly our fault that this has happened,” Lewis continues. “While AirPooler has attracted a huge pilot base, there were still a number who were holding back.”

Some had been harassed by FAA officers, who were leaving messages on their voice-mails saying they had seen a listing from the pilot on a ride-sharing website and they could be flouting the regulations.



Cessna TTx is a popular ride-share offering



Twin-engined models like the Beechcraft Baron are commonly seen on flight-sharing sites

“They aren’t violating the law,” says Lewis. “Before we launched AirPooler, we made sure that our operation was consistent with regulation and best practice. Our attorney ran the FAA legal office for regulations until a year ago, so she is arguably in the best position to understand the law on this,” he continues.

However, in order to get these concerned pilots on board, AirPooler decided to ask the FAA to “clear the air” and clarify the rules on ride-sharing. “We assumed it would be a straightforward process, but instead we stepped on a hornets’ nest,” Lewis says.

In reply, the FAA cited its longstanding view that expense-sharing is compensation, unless a private pilot has “a common purpose with his or her passengers and... his or her own reason for travelling to the destination”. Effectively, pilots must acquire Part 119 certification reserved for common carriers.

“This is an onerous process that no private pilot would be able to undertake,” says Lewis.

CHANGING THE RULES

Flytenow’s Guichard, a qualified lawyer, says the argument is baseless, accusing the authority of trying to hammer a square peg into a round hole by applying the “incongruent” regulatory framework of “common carriage” to the activities of expense-sharing pilots.

“If the FAA’s interpretation of Flytenow pilots as common carriers is correct, then Flytenow pilots would be the only common carriers in history to not seek commercial profit from their operations,” he says. “The term ‘common carriage’ is well-known and understood by the courts, and refers to a commercial transportation enterprise that is willing to take all-comers who are willing to pay a fare, without refusal.”

Lewis agrees. He says that, traditionally, the FAA has considered expenses – contributions to fuel costs, for example – not to be compensation. “The only thing that has changed is the internet and modern sharing economy technology, which makes it much, much easier for all concerned to ride-share,” he says.

Lewis says that in order to establish its posi-

tion on ride-sharing, the FAA consulted a draft 1963 law to find the citation that would determine that expense-sharing is compensation.

“They didn’t mention in their letter that the following year, it reversed this ruling and ever since they have been telling folks that expense sharing is not compensation,” says Lewis.

Based on the historical records, statutes and “the best legal representation we could find,” AirPooler was confident that if nothing had changed apart from the technology, they were fully compliant with the regulation.

The FAA’s ruling has, however, hit the ride-sharing community hard.

“We went from having hundreds of flights listed to only a trickle,” says Guichard. “Pilots don’t want to get on the wrong side of the FAA.”

Both companies have appealed the FAA’s ruling and hope to get a verdict early next year.

In the meantime, Flytenow has voluntarily restricted the ability of pilots to post their flights pending the court ruling. “We think this is the most prudent decision,” Guichard says. “Because while some pilots and enthusiasts would continue to use the site, we don’t want to enable anything the FAA deems inappropriate – even though we disagree.”

Under the FAA’s new regulatory regime, a pilot’s mere communication with potential passengers would be considered advertising indiscriminate air-transportation services – also known as “holding out”, Guichard explains.

“We are optimistic the court will rule in our favour though, so we expect to re-launch the website next year.”

Lewis says the ride-sharing industry has the backing of the GA caucus in the US Congress, and the industry trade bodies such as the Aircraft Owners and Pilots Association and the National Business Aviation Association.

These bodies have welcomed these new initiatives, he says. “By bringing new people into the industry and getting the pilot population flying again, ride-sharing is providing a much-needed lifeline to an industry in a critical condition,” Lewis adds. ■

LEGACY LAUNCHPAD

For Brazilian champion Embraer, a growing presence in Florida is tapping a huge local talent pool that may kick off a move on the top end of the business jet market

STEPHEN TRIMBLE MELBOURNE, FLORIDA

In less than a year, a new name will join the top rank of North American cities hosting final assembly sites for business jet aircraft, rivalling the dominance of Wichita, Kansas; Dorval, Quebec; and Savannah, Georgia.

That city will be Melbourne, Florida.

A third planned expansion at Embraer's site next to Melbourne International airport is under way. When the expansion opens in mid-2016, Melbourne will have the capacity to deliver more than 100 business jets annually from a central Florida site that opened only three years ago. That puts the Brazilian airframer within striking distance of the annual output of the Cessna Citation Jet plant in Wichita, Bombardier's combined Global and Challenger factory in Dorval, and Gulfstream's widebody complex in Savannah.

Embraer's expansion in Melbourne coincides with the manufacturer's evolution as a global concern, with manufacturing facilities in Brazil, the USA, Portugal and China.

The Melbourne site is the company's most ambitious move outside Brazil. It will be the final assembly location for four Embraer executive jets – the Phenom 100, Phenom 300,



The Florida site started for Phenom assembly

Embraer will have spent eight years and about \$150 million to complete the manufacturing and engineering complex in central Florida.

It is possibly only the beginning. Embraer has made no secret of plans to explore the market for large cabin, ultra-long-range business jets. The decision on where to make them remains more distant, but Melbourne's rapid rise as Embraer's plant for executive jets makes it a prime candidate. In the near-term, Embraer could expand capacity with more assembly tasks on-site. The first step is to keep assembly in Melbourne on track through mid-2016.

Embraer opened its Melbourne factory in 2011. The company planned to make only a portion of the Phenom 100 and 300 jets being delivered to North American customers, but its remit was expanded to become the exclusive final assembly site. Embraer then announced an expanded factory would begin producing Legacy 450 and 500 jets as well.

The expansion will add a spacious new wing perpendicular to the Phenom assembly line. Both the Phenom and Legacy assembly lines will run length-wise down the new wing. The space occupied by the first half of the Phenom assembly line will stage kits and subassemblies.

The Melbourne site brings Embraer closer to major North American suppliers. The Phenoms have Garmin avionics and Pratt & Whitney Canada engines. The Legacy 450 and 500 feature Rockwell Collins avionics and Honeywell engines. The major structures, however, are built up in Brazil and Portugal. Major fuselage sections and wing assemblies are shipped to a deepwater

port in Jacksonville, Florida, then loaded onto trucks and driven south to Melbourne.

Embraer is not the only aerospace company to discover the attractiveness of the US southeast for manufacturing. Gulfstream has been assembling a series of large business jets in Savannah since the late 1960s. Airbus recently opened a final assembly line in Mobile, Alabama, for A320 airliners. And a potential Embraer rival, HondaJet, expects to start delivering light jets from a sprawling factory in Greensboro, North Carolina.

Embraer is no stranger to the US southeast. Just a decade after its formation in 1969, the company opened a US sales office in Florida. As the Brasilia turboprop became established in US fleets, Embraer established a permanent sales and maintenance hub next to Fort Lauderdale-Hollywood International airport.

Embraer's defence business also has a growing presence in Florida. In the northern city of Jacksonville, it builds Super Tucanos for Sierra Nevada, which has a contract with the US Air Force to deliver the light attack fighters and advanced trainers to partner militaries, such as the Afghan air force.

DOWNTURN OPPORTUNITY

When Embraer sought an executive jet assembly centre in the USA in 2008, Florida was not the only option. In Wichita, for example, the global downturn would have severe repercussions for local business jet manufacturers Cessna, Hawker Beechcraft and Bombardier Learjet, creating a glut of jobless experienced workers and surplus production capacity. Airbus quickly established an engineering centre in Wichita.

Embraer was instead attracted to central Florida. Melbourne offered logistical advantages in-

"When you add these US capabilities, we can think higher than we used to"

PAULO PIRES

MD, Embraer Melbourne engineering centre

Legacy 450 and Legacy 500. It includes a jet delivery centre and what will become the company's largest engineering centre outside Brazil, employing 200 staff at peak levels designing interiors and premium seating.

The site is expanding as Embraer invests in US companies, last year acquiring California-based Aero Seating Technologies (AST). The rebranded Embraer AST, including an aircraft seat factory, is moving to Titusville, Florida, a town next to Melbourne. By mid-2016,





Third expansion of Embraer's Melbourne production line is expected to be operational by mid-2016

cluding easy access to deepwater ports and the runway of a relatively lightly used commercial airport. It was also on familiar ground in a state where it had deep roots. Most important, perhaps, was the imminent demise of NASA's space shuttle programme, with its huge launch complex in nearby Cape Canaveral. With thousands of trained aerospace engineers and mechanics set to enter the job market, Melbourne offered a perfect location for establishing manufacturing and engineering centres in the USA. The engineering centre started taking shape soon after Phenom assembly began in 2011.

Embraer employs 4,000 engineers and 2,000 technicians at sites in São Paulo state, recruited mainly from Brazil's aeronautical engineering colleges. The Institute of Aerospace Technology, for example, produces about 120 graduates per year. Students join engineering graduates of institutions such as

the University of São Paulo to form a 1.5-year Embraer graduate programme. That output is less than the annual output of aerospace engineering graduates produced by private and public universities in Florida alone.

QUALIFIED PEOPLE

"Being in Florida enables us to access these qualified people," says Paulo Pires, Embraer's managing director of the Melbourne engineering centre. "The American aerospace market is huge compared to Brazil."

Embraer aligned the engineering centre to fill a speciality that does not exist in Brazil. Several decades of US business jet manufacturing has developed a cadre of interiors specialists – experts in not just seating, monuments and interior walls, but how they fit into interior systems, including in-flight entertainment and environmental controls.



Melbourne will assemble Legacy 450s and 500s and host Embraer's biggest engineering centre outside of Brazil

"When you look at the United States, there is a huge market with a lot of companies," Pires says. "When you add these capabilities, it enables us to think higher than we used to."

The engineering centre is a turnkey complex for designing and testing premium interiors. The facility houses enough office space for 200 workers, of whom 100 have already been hired. These engineers can produce and test designs with an on-site rapid prototyping cell able to quickly produce mock-ups of cabins and interior structures. But the physical products will not always be necessary.

Earlier this year, Embraer leveraged a grant from Space Florida for an on-site virtual reality centre. Three-dimensional engineering drawings developed using Dassault Systèmes Catia V5 software are available. The drawings are then projected in 3-D form into full-scale, virtual models projected onto the floor. Workers wearing specially designed goggles can virtually walk through a fully designed aircraft cabin. The system is supplied by camera maker Canon on a grant from Space Florida.

"These 200 engineers are the first goal. Beyond that I think the market will say"

PAULO PIRES

MD, Embraer Melbourne engineering centre

Such technology goes beyond anything that Embraer is using in São Jose dos Campos, its Brazilian headquarters. That has made the centre's capabilities attractive beyond the executive jets division. Indeed, with the certification of the Legacy 450 last August, Embraer does not have an announced executive jet in development for the first time since 2005.

The company, however, is developing a new family of re-engined and re-winged commercial regional jets. The E-Jet E2 family have economy-class cabins that do not demand the kind of speciality knowledge now available in Melbourne. But the new E-Jets will be offered with premium-class cabins with amenities not far removed from Phenom- and Legacy-class private jets.

So Embraer has teamed the Melbourne centre with its recently acquired seating manufacturer, Embraer AST, to develop business-class seating for the E2 family of jets.

The role of the Melbourne engineering centre beyond the E2 will continue to be premium-class systems. By then, Embraer may finally be ready to challenge the industry's elite club of companies capable of developing ultra-long-range, large cabin business jets. If the company decides to make such a move, the Melbourne site's new capabilities will be an essential piece to making the programme a success.

"These [first] 200 engineers are the first goal. We must get there," Pires says. "Beyond that I think the market will say." ■

CUTTING A NEW PATH FORWARD



Perryville remains a maintenance centre for the remaining fleet of Rockwell Sabreliners

Free of a non-compete agreement that barred it from the civil aviation market, Sabreliner Aviation is now pushing to exploit its legacy as a full-service aircraft manufacturer

STEPHEN TRIMBLE PERRYVILLE, MISSOURI

Winding through a rural highway about a dozen miles northeast of Perryville, Missouri in early autumn, a visitor discovers that a field of corn stalks ripe for harvest almost swallows a sign announcing the destination: “Sabreliner Aviation”.

Lying just beyond the end of the adjacent Perryville Municipal Airport’s 7,000ft runway is the Mississippi River and the small, almost lifeless village of Kaskaskia, Illinois.

Although now nearly abandoned, Kaskaskia was once an important regional centre, and briefly the state capital. Soil erosion forced the riverbanks to drift eastward, however, destroying a once-significant city, leaving virtually no trace. So, the corn stalks of the fertile Mississippi plains recently threatened to engulf Sabreliner’s four-hangar, Perryville campus. Once

a thriving assembly centre of the iconic Republic Aviation business jet, Sabreliner was by 2012 on the brink of financial extinction.

When the Perryville assembly line finally closed in the early 1980s, Sabreliner developed into a successful, diversified maintenance centre. Its background as a Rockwell Sabreliner completions facility and assembly centre lent a rare combination of skills and tools. Commercial and military customers took notice.

But then Sabreliner sold its St Louis-based MidCoast Aviation business to Jet Aviation in 2006. The deal included a broad non-compete agreement with Jet in the commercial market – the company could pursue any domestic or foreign military project, but its commercial activity was largely limited to maintaining the remaining Sabreliner fleet.

By that point, the Perryville-based unit of Sabreliner was focused on a rapidly rising

defence business, swollen with demand for maintaining several of the US military’s ageing fleets of aircraft, including the Learjet 31-based C-21 and Beechcraft King Air-based C-12. But it would have few options when defence spending started to decline after 2010, with commercial business still inaccessible under the non-compete agreement.

By 2012, Sabreliner had laid off all but a skeleton team administering financial and legal affairs. Then Innovative Capital Holdings – a Naples, Florida-based investment firm – stepped in to purchase the company. The acquisition price was never disclosed – however, Innovative Capital’s website describes a strategy focused on buying aerospace manufacturing companies with deals priced up to \$50 million.

FUTURE INVESTMENT

Innovative Capital specialises in turnaround jobs, especially within the aerospace industry. It describes itself as an investment firm, drawing a sharp distinction with private equity firms driven by short-term financial objectives.

Innovative Capital is a long-term investor that has ambitious goals for the Perryville-based aviation services firm. Those objectives



ters. On a recent visit, for example, one hangar was occupied by a Mexican navy Airbus Helicopters H225M, receiving an auxiliary power unit upgrade, and a Jordanian Sikorsky UH-60 Black Hawk undergoing a conversion to a VIP interior.

The helicopter hangar in Perryville reflects the revitalisation of the site under its new ownership. The decades-old structure has been extensively refurbished into a contemporary aerospace manufacturing facility, with LED lighting and clear, bright colours on the floors and walls.

Local operations resumed in Perryville in February 2014 with a new leadership team and a new strategy no longer burdened by the now-expired non-compete agreement. It was again free to pursue a balanced business portfolio of commercial and military work.

Rebalancing the portfolio with a strong commercial services business is a top priority, says Sabreliner president Greg Fedele.

NEW DEALS

“The military and the commercial stuff in aerospace really do complement each other. When one’s up, the other’s down. That’s usually what we see in aerospace. When you only have one side of that equation and that equation starts going down and you don’t have anything to backfill, that’s an uphill climb,” he says. “Our plan is to try to stay more balanced in the military and commercial world.”

Non-Sabreliner types are beginning to return to Perryville for a variety of jobs. Sabreliner, in fact, is negotiating a new partnership with Dassault Falcon, with the goal to offer parts services outside the network of authorised service centres. “That’s more our core business,” Fedele says. “If you look at our strategy, we are growing our core business, what we have here today.”

The rural Perryville site appears to be an unlikely location for a full-service aircraft manufacturer, but those capabilities still reside inside Sabreliner’s hangars, which include shops for paint, upholstery, avionics, engines and composite structures.

extend beyond revitalising Sabreliner’s commercial aviation-services business, which was abandoned with the sale of MidCoast Aviation to Jet. It also wants Sabreliner to reclaim its original purpose as an aircraft manufacturer – or, at least, a remanufacturer. It has targeted several aircraft types as remanufacturing candidates, including in-production and out-of-production models. Announcements are expected as soon as the NBAA convention later this month.

In the longer-term, Sabreliner’s association with Innovative Capital raises even more intriguing possibilities. Business records online suggest Innovative Capital has acquired New Zealand-based Composite Helicopters. The renamed Inova Composite Helicopters is attempting to transfer composite structure technology to helicopters from New Zealand’s competitive sailing industry. The result is a programme to certificate two light single-engined helicopters with composite semi-monocoque construction – the KC-630 and KC-640.

Sabreliner may prove an attractive site to establish a US manufacturing base for such turbine-powered helicopters. In addition to servicing fixed-wing jets, Sabreliner provides a similar line of offerings for military helicop-

“We have a broader capability than most,” Fedele says. “We only do everything. You name something on an airplane we can do it. It’s crazy when you walk through here and you see everything they had, and it’s laid out perfectly from when they used to do the finishing work for the Sabreliners.”

But the re-emerging company still commands a significant military business. Through it no longer supports the US Air Force C-21s, it remains a specialist on devel-

“If you look at our strategy, we are growing our core business, what we have here today”

GREG FEDELE

President, Sabreliner

oping analytical data on the service’s ageing aircraft fleets. In late September, the Air Force Academy awarded Sabreliner a contract worth up to \$100 million over the next five years under the Center for Aircraft Structural Life Extension (CASTLE) programme.

The contract has Sabreliner receiving Boeing KC-135s that have been retired, cut-up and delivered on pallets. Workers at the company’s site in nearby St Genevieve, Missouri, dismantle each piece of the remaining structure, down to bolts and rivets. These pieces are sent to the Air Force Academy for laboratory analysis, helping the CASTLE staff determine the ageing issues the USAF can expect to appear next.

All the activity around the company has raised questions about its branding. For some, its name implies a focus on the dwindling fleet of Sabreliner jets, or its T-39 predecessor as a military trainer. The company still provides such services, but it is a diminishing minority of business activity.

“People say, ‘I didn’t know you did that’. We hear it all the time,” Fedele says, “because we couldn’t compete [until 2011, due to the Jet Aviation agreement] and we have a pretty robust portfolio. It’s just getting the word out there.” ■



The paint shop is just one capability left over from the days of Sabreliner final assembly

Aviation Tomorrow: Managing New Challenges, Realising New Potentials



The Singapore Airshow Aviation Leadership Summit (SAALS) brings together key stakeholders of the global civil aviation industry to exchange valuable insights and strengthen the nexus between governments and the aviation industry.

Taking place every two years, SAALS has established itself as the definitive global aviation conference in Asia that offers a unique platform for industry players to engage government officials in an exchange of ideas to advance the strategic interests of the aviation sector. More than 320 attendees from 74 countries attended SAALS 2014, including over 100 top government representatives, civil aviation authorities and senior executives of airlines, airport operators, aircraft manufacturers and aviation-related companies as well as the heads of the International Air Transport Association (IATA) and the International Civil Aviation Organization (ICAO).

Propelling SAALS as a forum that shapes the future of the aviation industry is the dynamic partnership between the industry and government. Some of the esteemed speakers at past Summits include Emeritus Senior Minister, Singapore, Mr Goh Chok Tong, International Civil Aviation Organization (ICAO)

Council President, Dr Olumuyiwa Benard Aliu, Administrator of the US Federal Aviation Administration, Mr Michael Huerta, ex-European Commission Vice President and European Commissioner for Transport, Mr Siim Kallas, and International Air Transport Association (IATA) Director-General and CEO, Mr Tony Tyler.

To be held from 14 – 15 February 2016, the theme of SAALS 2016 is “Aviation Tomorrow: Managing New Challenges, Realising New Potentials”. The Summit will focus on new ideas and emerging technologies, while presenting new challenges for the sector and providing new opportunities and enablers to further drive the success of global aviation. SAALS 2016 will include keynote speeches from high-level government representatives, as well as panel discussions that will examine new developments in aviation and the role regulatory frameworks play in supporting these innovations and allowing the industry to deliver its full potential in a sustainable manner. Singapore's Prime Minister Mr Lee Hsien Loong will be the guest-of-honour at the opening dinner of SAALS 2016.

Mr Kevin Shum, Director-General, Civil Aviation Authority of Singapore, said, “Aviation



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is a linchpin of the global economy, connecting people, businesses and ideas from all over the world. While growth in the sector remains strong, it also brings with it increased complexities and challenges. Through SAALS, we can catalyse critical conversations among movers and shakers in global aviation to shape the future landscape of aviation and ensure the sustainability of aviation.”

SAALS 2016 will focus on three key areas of discussion:

- 1.** The future of the Global Air Hub model
- 2.** The evolving role of drones in aviation and their impact on the industry
- 3.** The way forward for reaching a Global Agreement on Aviation Emissions at the 2016 ICAO Assembly

SAALS is jointly organised by Singapore Ministry of Transport (MOT), Civil Aviation Authority of Singapore (CAAS), IATA, and Experia Events. Experia Events is also the organiser of the Singapore Airshow 2016.

For more information, visit
www.aviationleadershipsummit.com



From yuckspeak to tales of yore, send your offcuts to murdo.morrison@flightglobal.com

Name that plane from Ukraine

Fancy making a name for yourself in the Ukrainian aerospace industry? Antonov is running a contest on Facebook to come up with a moniker for the An-178 freighter – which debuted at Paris and will be on show in Dubai also.

This will be the programme's official and permanent name, not just a ceremonial tag to slap on one fuselage.

Antonov reminds us that most of its famous types include the letters "An" following a style set by Oleg Antonov (such as An-2 Annushka, An-22 Antaeus and An-124 Ruslan). NATO, of course, knew them by other names, as Antonov points out – the An-2 Colt, An-22 Cock and An-124 Cossack (C standing for cargo). The name with the most likes on facebook.com/antonov.company.ua by the closing date of 19 December will win. And, no, suggesting Tincan is not constructive.

Have I got Neos

"Rolls-Royce Trent 1000 engines to power new operator Neos".

Has the engine maker made a quicker-than-expected return to the narrowbody market, we mused, when this release from Derby arrived – and has Airbus decided to offer a third engine option on its new-generation A320s as it ramps up to rate 60?

Sadly, it refers not to Toulouse's Neos but, somewhat more mundanely, to Italian airline Neos, which has chosen the Trent for its Boeing 787-8s.



"Now you're just getting things out of proportion"



"Anastasia's a lovely suggestion, but could you get us down?"

You had one job

Somebody will be kicking him or herself following this spelling blunder that emblazoned every roller banner at the recent Airborne ISR conference in London (right). Unless their intent was to offer some indirect marketing for the namesaked Eastbourne air show, that is.

Par for course

Textron, owner of brands such as Cessna, Beechcraft and Bell, is a curious beast in that as well as its portfolio of stylish aircraft, it also owns EZGO and Jacobsen, that manufacture golf buggies and mowers.

On a recent earnings call one analyst was heard to moan that "no-one ever talks about golf carts". Let's think, would you rather focus on the glamorous



"Oh, you shouldn't have"

business jets; the sturdy, yet nimble, King Air; the awesome V-22 Osprey; the fearsome AH-1Z attack helicopter; or a device for transporting middle-aged men wearing lurid trousers and pastel-coloured sweaters around a golf course? Nope, we can't decide either.

Winging it

We suspect a bit of errant cutting and pasting on this feature in BA's *High Life* in-flight magazine (left). Did someone lift the details from the previous A380 article? An A320 with wings bigger than a 747's: now that we'd like to see.

Thanks to Peter Davison and others for pointing it out.

Hit where it huts

"On the 7th inst., our aeroplanes bombed some

100 YEARS AGO

German hutments, apparently with good effect. As a result of a protracted air fight on the same day a German machine was overturned and fell inside the enemy's lines from a height of 7,000 ft. In another fight near Douai we lost an aeroplane."

A Herculean effort

Greek bombers, presumably Blenheims, have bombed aerodromes at Koritza and Argyrokastró and are claimed to

75 YEARS AGO

have destroyed several enemy aircraft on the ground, and they have also dropped bombs on Italian batteries and concentrations of other troops.

A Darling idea

A tracking and telemetry station for use with NASA's

50 YEARS AGO

coming Applications Technology Satellites is to be

established at Cooby Creek, 16 miles north of Toowoomba in the Darling Downs, Queensland, and 80 miles west of Brisbane.

New Fokker jet

Fokker is poised to launch a 130-seat derivative of the

25 YEARS AGO

Fokker 100 twinjet airliner early next year. The company says there is

"considerable interest" from Fokker 100 operators USAir and American as well as several other major US airlines.

100-YEAR ARCHIVE

Every issue of *Flight* from 1909 onwards can be viewed online at flightglobal.com/archive

FLIGHT INTERNATIONAL

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The opinions on this page do not necessarily represent those of the editor. Letters without a full postal address supplied may not be published. Letters may also be published on flightglobal.com and must be no longer than 250 words.

Crying out for safe evacuation

In the aftermath of the British Airways Boeing 777 incident that occurred on 8 September at McCarran airport, Las Vegas, there has been much talk of measures such as 'central locking' for overhead bins to avoid passengers slowing the process by grabbing their bags.

This locking system might not comply with current regulations. The evacuation is generally triggered by an announcement from the captain, followed by the sounding of the alarm.

Typically, this announcement should be: "This is the captain. Evacuate, evacuate." But the addition of a lawful order from the commander, such as: "Leave your bags behind", might greatly mitigate the risk of the aisles being – perhaps fatally – jammed with bag-wielding passengers.

It might just work.

Terry Buckland

Cuckfield, Sussex, UK

Easy operation

In his letter (*Flight International*, 27 October-3 November)

SAFETY

Scrutinising design standards

In response to your article about maintenance personnel fitting a hydraulic actuator on a Virgin Atlantic Boeing 747 upside down, (*Flight International*, 27 October-2 November): this event is not the first time that incorrect fitting of a component has occurred resulting in a flight safety incident.

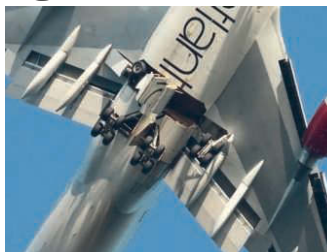
I remember a Royal Air Force Sepecat Jaguar where the two hydraulic systems were cross-connected, contributing directly to the loss of the aircraft. I also remember a damper on a Boeing Chinook helicopter being fitted in reverse orientation, resulting in a serious incident.

It should be impossible to fit a component in a safety-critical system incorrectly. As previous incidents show, if it can be fitted incorrectly, one day it will be fitted incorrectly. If we really want to prevent recurrence, we need to make these kinds of maintenance errors impossible. Design standards for future aircraft and major modifications should be clear on this point.

I accept the difficulty in changing the design of legacy aircraft but, in my view, there should be a risk assessment made in each case by the type certificate holder. This is an airworthiness issue. I hope that is what the Air Accidents Investigation Branch report recommends.

Dave McCormick

Via email



Maintenance error led to incident

David Hayfield says unmanned air vehicles need experienced flyers because they "are so difficult to fly". This is not always true.

In my experience, some UAVs are usually better operated by people who are not pilots. I refer to co-axial, open-rotor machines such as the Beijing Seagull and the MLA Sprite.

Operating from a small area, the rotors are spun up and the built-in-test-equipment checked for all systems operating. The flight operator then demands a height to which the UAV will climb vertically to hover unless, after lift-off, the operator commands a flight speed and direction into which the aircraft will

cruise. The payload operator directs the camera and other sensing or mission devices.

To land, the operator returns the UAV to a position at a height above ground of, say, 30m and commands "land". The aircraft then automatically descends vertically at a rate of descent proportionate to its height above ground.

On demonstrations to customers in various parts of the world, we would often say: "You can now take over" – much to their surprise.

"Pilots" however, got bored with the ease of operation and wanted to show off, but couldn't.

Reg Austin

Via email

In defence of the aircraft engineer

In his letter, (*Flight International*, 3-9 November), J McDermott expresses surprise that Boeing had "designed a part that can be fitted the wrong way around".

It is true that such parts could be made to fit one way only. I can think of a few more actuators, such as one in the air conditioning packs of the Boeing 767, that can be, and have been, fitted the wrong way around.

However, while designing maintenance error out is feasible in many cases, where it is not, manufacturers and regulators opt for other defences – such as the need to adhere to maintenance data with regards to tooling, equipment, independent inspections and staged recording of tasks.

Further defences such as comprehensive shift handovers and occurrence reporting are other steps in breaking the causal chain. All the foregoing are stipulated in a European Aviation Safety Agency approved Part 145 Maintenance Organisation Exposition.

In the case of the 767 actuator mentioned above, a decal placed next to it stresses the need to ensure it is fitted the right way around, with a drawing.

As an aircraft maintenance engineer myself, I can guarantee that the maintenance engineers involved in the replacement of the Virgin 747's landing gear actuator had every intention of ensuring that the task was completed safely, but were probably victims of one of the many 'double binds' afflicting maintenance: in this case, lack of proper tooling (the hoist) and – that double-edged sword – resourcefulness.

Christian Hollyer

Milford Haven, Pembrokeshire, UK



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Bogota, Colombia
expodefensa.com.co

1-2 December

Military Airlift & Rapid Reaction Ops
Seville, Spain
smi-online.co.uk/defence/europe

8-10 December

Aerospace Meetings Brazil
Sao Paulo, Brazil
bci.aerospace.com/brazil

21-23 January 2016

Bahrain International Airshow
Bahrain
bahraininternationalairshow.com

3-4 February 2016

Aircraft Interiors Middle East
Dubai World Trade Centre, UAE
aime.aero/welcome-to-aime-2016

16-21 February 2016

Singapore Air Show
Changi Exhibition Centre, Singapore
singaporeairshow.com

17-19 February 2016

Routes Americas
Puerto Rico
routesonline.com/events/178/
routes-americas-2016

1-3 March 2016

Heli-Expo
Louisville, Kentucky, USA
heliexpo.rotor.org

6-8 March 2016

Routes Asia
Manila, Philippines
routesonline.com/events/180/
routes-asia-2016

15-17 March 2016

IATA World Cargo Symposium
Berlin, Germany
iata.org/events/wcs/pages/index.aspx

22-23 March 2016

Aerial Firefighting International
Sacramento, California, USA
tangentialink.com/event/aerial-
firefighting-international-2016

26 March - 3 April 2016

FIDAE
Santiago, Chile
fidae.cl/en

5-7 April 2016

Aircraft Interiors
Hamburg, Germany
aircraftinteriorexpo.com

12-14 April 2016

ABACE
Shanghai, China
abace.aero

18-21 April 2016

Defence Services Asia
Putra World Trade Centre, Kuala Lumpur
dsaexhibition.com

2-5 May 2016

Xponential
New Orleans, USA
xponential.org

24-26 May 2016

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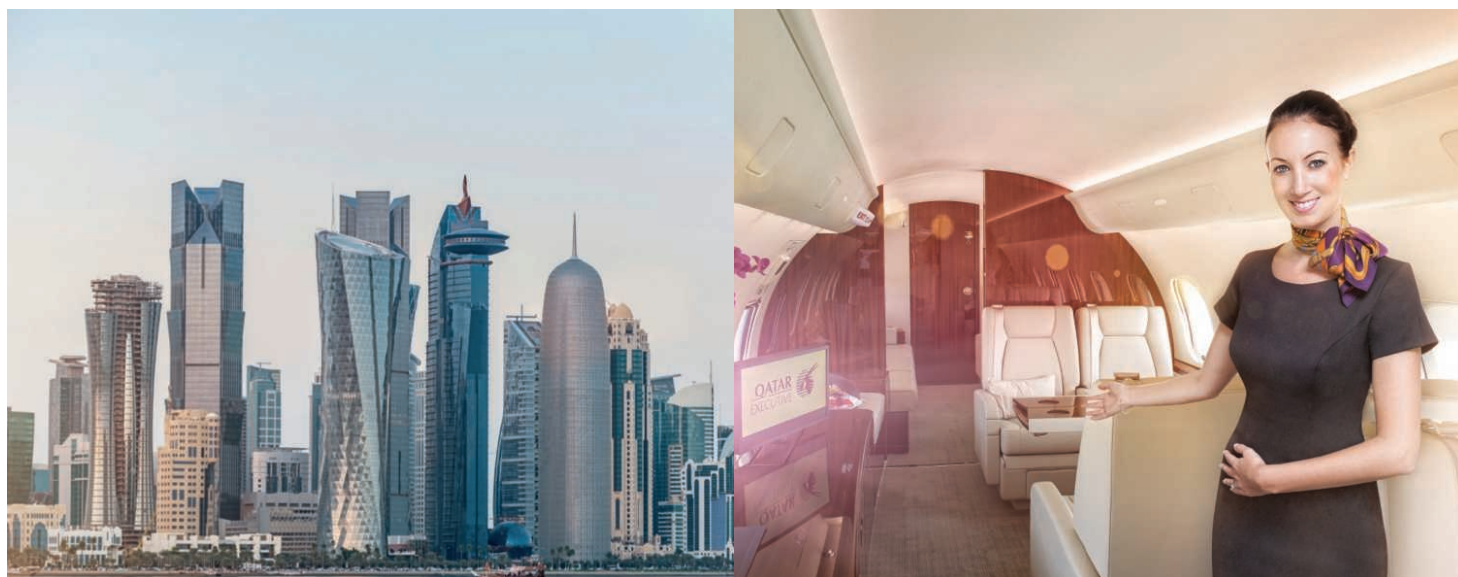
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Gabriella Somerville cut her teeth in aviation with Virgin Atlantic, British Airways and Skyjet, before establishing charter-broking business ConnectJets, an award-winning start-up with which she has had success from the off

Tell us about your career so far

My career to date has primarily been within the aviation sector, covering a short spell as a croupier for a London casino. I began my career in aviation with Virgin Atlantic, working as an air stewardess, and spent seven glorious years under the umbrella of Richard Branson and his team. Working at Virgin gave me an appetite for setting up on my own – to see first-hand the workings of an aviation start-up was just the apprenticeship that I needed. After that, I went on to British Airways, starting out as cabin crew and moving on to work in special services, then a fleet manager and finally customer-service manager for the crew at London Gatwick. It was at BA that I had my first taste of leadership, managing more than 200 cabin crew and the unions! Having spent 14 years in commercial aviation, I took a short sabbatical, started a small events company and lived in Chamonix for a short period. However, it was not long before I was parading the corridors of the European Business Aviation Convention and Exhibition and was duly introduced to Judith Moreton, who was managing director of Bombardier's European charter operation, Skyjet. Judith then took me on to set up a client-relationship department at Skyjet based out of Farnborough. Some two years later, Skyjet was taken over by Vistajet and I was given the role of VP of sales for their card programme. It was then, in 2009, that I went solo.



Somerville got her first taste for leadership managing cabin crew at BA

The commercial and business-aviation worlds are very different. Was the transition easy for you?

Indeed, they are poles apart. However, I found the transition easy under the leadership of Judith Moreton. Setting up a new department gave me a huge appetite to learn, and within a few months I felt at ease with both the operation and the industry.

Why did you decide to set up your own business?

Since the Virgin days I had always dreamed about setting up my own aviation company and in 2009 the timing was perfect. I had sold a property in the Alps, which had subsequently given me the seed capital to invest in the business.

Tell us about ConnectJets

It was launched in June 2009. The initial business model was to service a charter-broking business. One year later, we had a turnover of £4 million (\$6.15 million) with

zero debt and were duly involved in selling aircraft and leasing at this time. In 2013, we were awarded the Piaggio Avanti agency agreement for the UK and Territories. In 2014, we moved our office from Fairoaks Airport to Mayfair to further service our clientele and continue to expand our business.

It's an extremely competitive market. How do you stay on top of your game?

Business aviation is probably one of the most competitive markets in the world. I have always worked on the principle that if you deliver excellent customer service then you will stay on top. Most of our business is referral-led and our retention rate is very strong. Where most people today are speaking of being the new Uber platform for business aviation, we see ourselves as more the Savile Row – keeping our eye on the detail and making sure we

give above and beyond in terms of service. In 2012 we received a commendation for our services.

What does your typical day involve?

Too much! I am a workaholic. Predominantly my day consists of managing an operational business, serving our client base, managing a small team, business development and facing the everyday challenges of working in the world of aviation.

Where do you see yourself five years from now?

I recently became a mentor for the Virgin Unite programme and occasionally speak at various events on aviation and motivation. I would love to give more time to mentoring and encouraging more women to take up senior aviation roles. I am currently writing a book on business aviation, to be released next April, and surviving these last few tough economic years. Having just won the Honorary Global Exemplary Award for Entrepreneurship 2015 by the EU Women Inventors and Innovators Network, I am sure I will spend more time with start-ups in aviation and outside the industry. ■



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